American Aviation

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The F-102 is a rapier in the hand of the U.S. Airman. Built for the U.S. Air Force, Convair's F-102 interceptor is delta-winged and jet-powered, designed for the men who are *on guard for America's air defense.* Advanced aircraft like the F-102 are the result of . . .

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Sargent

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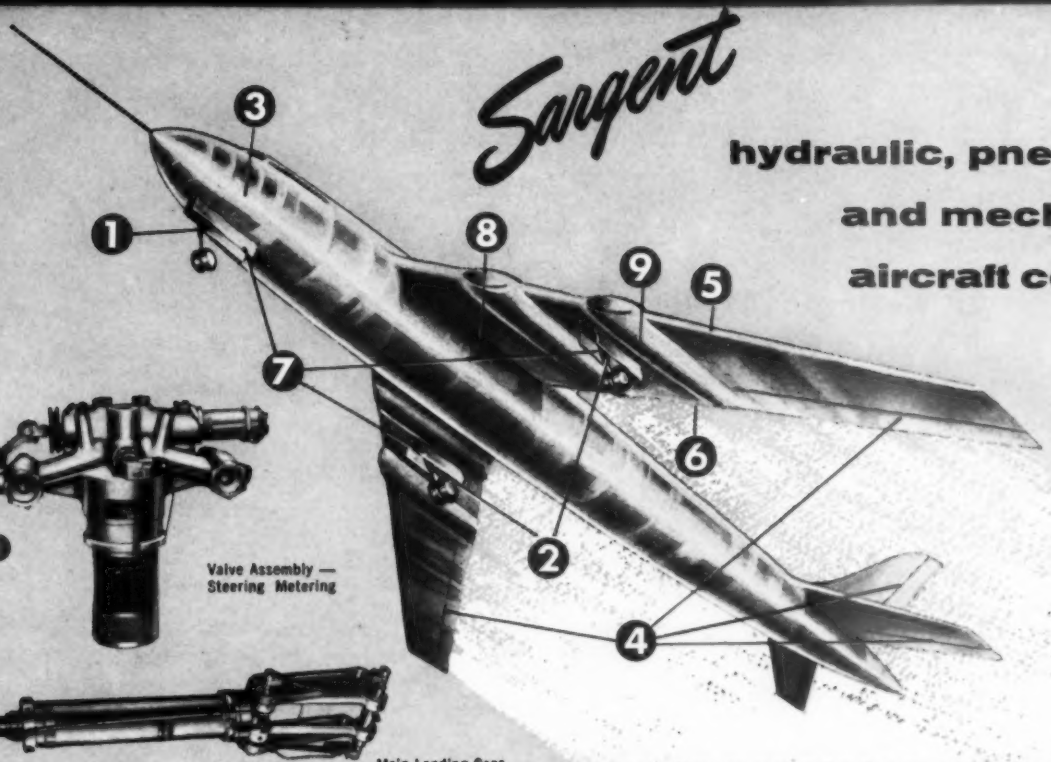
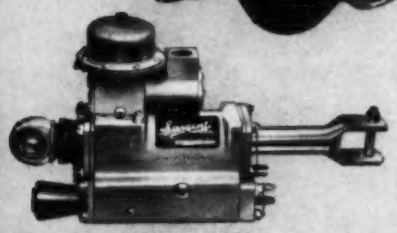


1 Valve Assembly — Steering Metering

2 Main Landing Gear Retractor

3 Brake Valves



4 Power control units for rudder, elevators and flaperons

5 Slat Actuating Cylinder

6 Gear Box Assembly — Outer Wing Flap Drive

7 Pneumatic Door Lock

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During the past 18 years Sargent has delivered more than 150,000 precision aircraft control units to the country's leading airframe manufacturers. Today Sargent manufactures 78 different hydraulic, pneumatic and mechanical units which are produced in a fully equipped modern plant, staffed by engineers and craftsmen skilled in the design and manufacture of these specialized aircraft components.

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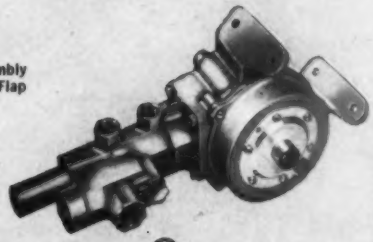
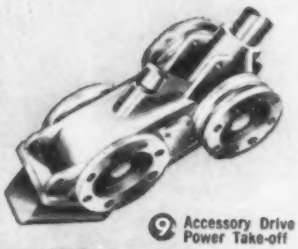


8 Spoiler Valve



9 Accessory Drive Power Take-off

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FACT IS: **of all airplane tubeless tires ordered to date, approximately 74% are Goodyear's.**

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West Coast: 8943 Wilshire Boulevard, Beverly Hills, Calif. Fred S. Hunter, manager; Raymond M. Schuster, regional advertising manager. Phone: Bradshaw 2-9339.

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OTHER PUBLICATIONS AND SERVICES

American Aviation Daily: Daily news service for the entire industry. $200 per year. Managing Editor—Keith Saunders.

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Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. $175 per year. Managing Editor—Wallace I. Longstreth.

Airports: Weekly newsletter for airport officials, suppliers, and services. Airmailed every Friday. $25 per year. Managing Editor—Lois C. Philmus.

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to indicate PRESSURE RATIO
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   .025 in 85% of readings at −55°C and +70°C.
   .035 in 15% of readings at −55°C and +70°C.
2. Altitude: No specific limitation.
3. Power: 115V, 400CPS, single phase, 18VA
4. Pressure Ratio Range: 1.2 to 3.4
5. Pressure Ranges (operating):
   Pt_2=2 to 50" Hg. Abs.
   Pt_7=2.4 to 100" Hg. Abs.
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6. Temperature Range: −55°C to +70°C.
7. Weights:
   Transmitter: 2.2 lbs.
   Indicator (including integral amplifier): 1.8 lb.
8. Response: Full Range in 7 seconds.

Actual photograph

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For over a quarter century, Kollsman has been making precision pressure sensitive mechanisms using displacement type diaphragms. This diaphragm can be called the heart of a thrustmeter pressure indicating system.

Our long experience making displacement type diaphragms guarantees reliable thrustmeters.

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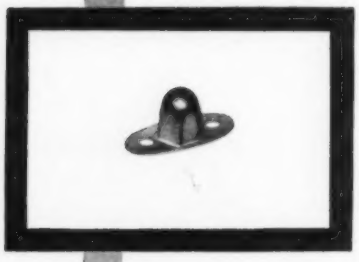

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Letters

Easy Road to Success

To the Editor:

I want to congratulate you on your editorial, "Easy Road to Success." We in the local service industry gnash and grind our teeth, making all sorts of loud noise in the Washington area without too much success. Articles such as yours are read, I'm sure, by our friends of the Civil Aeronautics Board with interest. They must certainly give them some consideration when a man of your stature and unbiased opinion comes up with the same opinion which we of biased opinion have long since come up with.

JANE S. EVERHART
Personnel Director
Mohawk Airlines
Ithaca, N. Y.

Easy Road—or Hard?

To the Editor:

Your editorial in AMERICAN AVIATION Jan. 17, "Easy Road to Success," has left me completely baffled as to its intent, motives or value to the public, the CAB, or even the North American "combine." I frankly marvel that so many words could be expended to say so little.

All that you claim to have been "quite simple" would fill volumes. If building something out of nothing in a most competitive field with no mail pay, government subsidies, and eight years of constant harassment by competitor lines, CAB, and editorials blind to the facts, is "easy," let me be the first to advise you not to try it.

Your statement regarding the start of the irregular carriers shortly after the war using surplus C-46's (C-47's were used) is a good indication of how little you are informed about the whole problem and, as many times happens, a little knowledge is a dangerous thing. Did it occur to you that an expedient way of discerning all factors would have been to contact the parties involved: Messrs. Weiss, Fischgrund, Lewin and Hart. I am sure their willingness to disclose all, about which you are so vague, would have surprised even you.

True, we are not without fault. North American Airlines inaugurated aircoach fares and gave to all the American public the fares they could afford to pay in spite of a determined effort by all certified carriers to maintain high tariffs pointed at a small segment of the people. I believe, therefore, it is a guilt to be determined only by that public who are, in the final analysis, the reason for our now being on the aviation scene.

I read in your blistering attack on the CAB no word of advice and no constructive criticism, and your leering remarks concerning the four smart operators make it apparent that, while your position may be big, your stature is small.

Thank God, Mr. Parrish, in this beloved land of private endeavor and free enterprise there is a law higher than (as you interpret it) the letter, intent, and spirit of the Civil Aero-

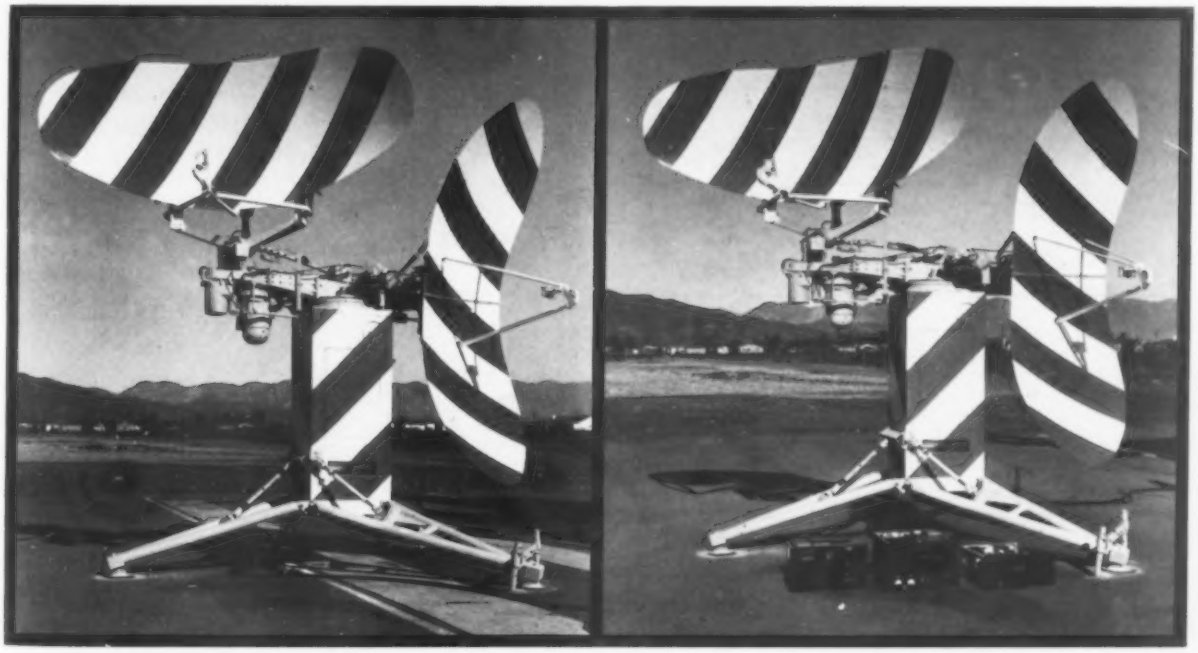
New higher power GCA **QUADRADAR** unveiled by Gilfillan

Two Models Now Meet Complete Range of Air Traffic Problems

Over two hundred international aviation visitors to the successful demonstrations of the 50 kw. GCA Quadradar during November and December 1954 in Los Angeles were also shown a completely new higher power 200 kw. Quadradar.

The 50 kw. Quadradar in field demonstrations and during the U. S. Air Force and U. S. Army operational evaluation tests now under completion exceeded both military and civil airport requirements. Now the 200 kw. Quadradar provides even greater performance capabilities with 40% increased range and altitude coverage over the 50 kw. equipment.

Both the 50 kw. and the 200 kw. Quadradar have complete remoting controls and instant multiple runway coverage.



50 kw. Quadradar operated perfectly during several recent California rainstorms. Successfully tracked F-86 jet fighters beyond 30 miles and above 20,000 ft. Both 50 kw. and 200 kw. models (at right) include proven circular polarization to eliminate rain and snow clutter.

GCA RADAR AND ELECTRONICS
Gilfillan
LOS ANGELES
GCA
AROUND THE WORLD

200 kw. Quadradar provides 40% additional coverage in range and altitude. Both models are identical except for three small components — transmitter, receiver and high voltage power supply — as shown. These 3 components quickly plug in to replace the 50 kw. components.

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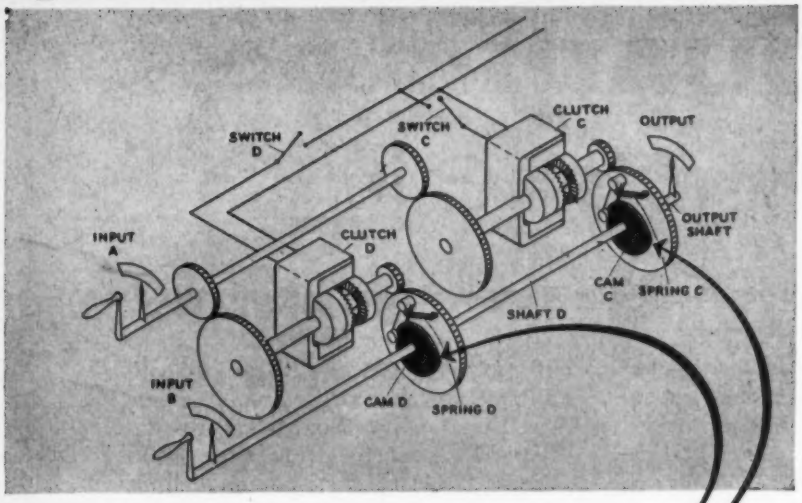
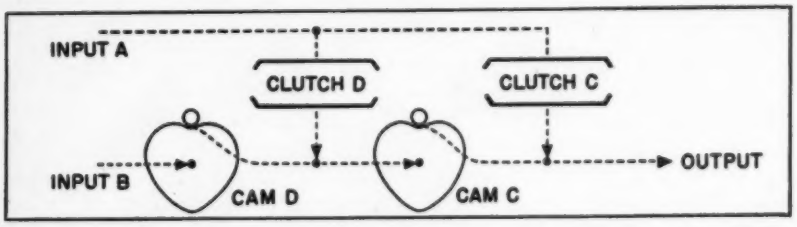
SINCE 1915 LEADERS IN AUTOMATIC CONTROL



MECHANICAL MEMORY with a heart

Ford Instrument Company engineers draw on the entire scope of scientific knowledge to solve each problem. In a recent project, Ford found good use for components it developed a score of years ago to produce a mechanical memory system whose accuracy is independent of the time interval, and which meets a military requirement of absolute reliability.



In an instrument in which the input quantities may vary with time, it is desired to produce an output equal to the change in one quantity A since the time t_1, added to the value that a second quantity B had at time t_1. At the same time it is desired to store another output equal to the change in quantity A since a second time t_2, added to the value that the quantity B had at that time t_2. It is further desired at any subsequent time to be able to read the first output or alternately the second output.

The storing of this information is accomplished by closing clutch C at instant 1 and clutch D at instant 2. The first output is then read directly at any subsequent time and the alternate output by opening clutch C. To recycle — clutch D is then opened.

Whatever problems must be solved in designing and manufacturing computers and controls, skills in electronics, magnetics, hydraulics and mechanical and electrical techniques are called upon by Ford engineers to develop the best instruments for the purpose.

If you have a problem in control engineering, Ford Instrument Company's forty years of experience in high precision design and production will help you find the answer.

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nautics Act. Fair play and justice for all still prevail and I, for one, predict they will continue long after your biased efforts to the contrary.

M. SWIDLER
San Francisco Regional Manager
North American Airlines

Can't Move the Forrestal

To the Editor:

The Newport News Shipbuilding and Dry Dock Company, located in Newport News, Va., recently built the largest ship in the world within the city limits of the City of Newport News.

I've heard that another hull, the largest of its kind in the world, was built in one place, moved through the streets, and launched several miles away. That hull was the Hughes Flying Boat. But it is hardly conceivable that the hull of the USS Forrestal is capable of such a trick.

If your writer, Mr. Robert M. Loebelson, would check his facts, he'd find that there is no other shipyard capable of launching a ship of the Forrestal's tonnage, certainly not one in Norfolk, Va.

We're quite proud that the largest industry in the Commonwealth of Virginia is located in our community. To have its products attributed to another community, as you did in the lead article of your Jan. 17 edition, is an unpardonable mistake.

EUGENE C. MARLIN
Manager
Patrick Henry Airport
Denbigh, Va.

Approved Safety Belts

REFERENCE VISCOUNT SAFETY BELTS PAGE 8, JANUARY 31. AIR ASSOCIATES WIRE INDICATES CAA APPROVED THEIR BELTS. UNLESS T. S. O. C-22-B HAS BEEN AMENDED CAA APPROVES NO MANUFACTURERS BELTS. CAA CAN RESTRICT INADEQUATE OR FAULTY BELTS HOWEVER. BUT MR. PIKE AGREES THAT REQUIRED CAA CERTIFIED APPROVAL WOULD ELIMINATE NUMEROUS GADGETS BEING OFFERED.

W. M. NOE
ASSOCIATED SUPPLIERS
LOS ANGELES, CALIF.

FOR MORE INFORMATION . . .

AMERICAN AVIATION prints all the information it can on new developments in the aviation industry. But neither AMERICAN AVIATION nor any other magazine can print it all.

So if you want more information about an item or service advertised or described in this issue, here's what to do:

NOTE THE KEY NUMBER appearing below the item.

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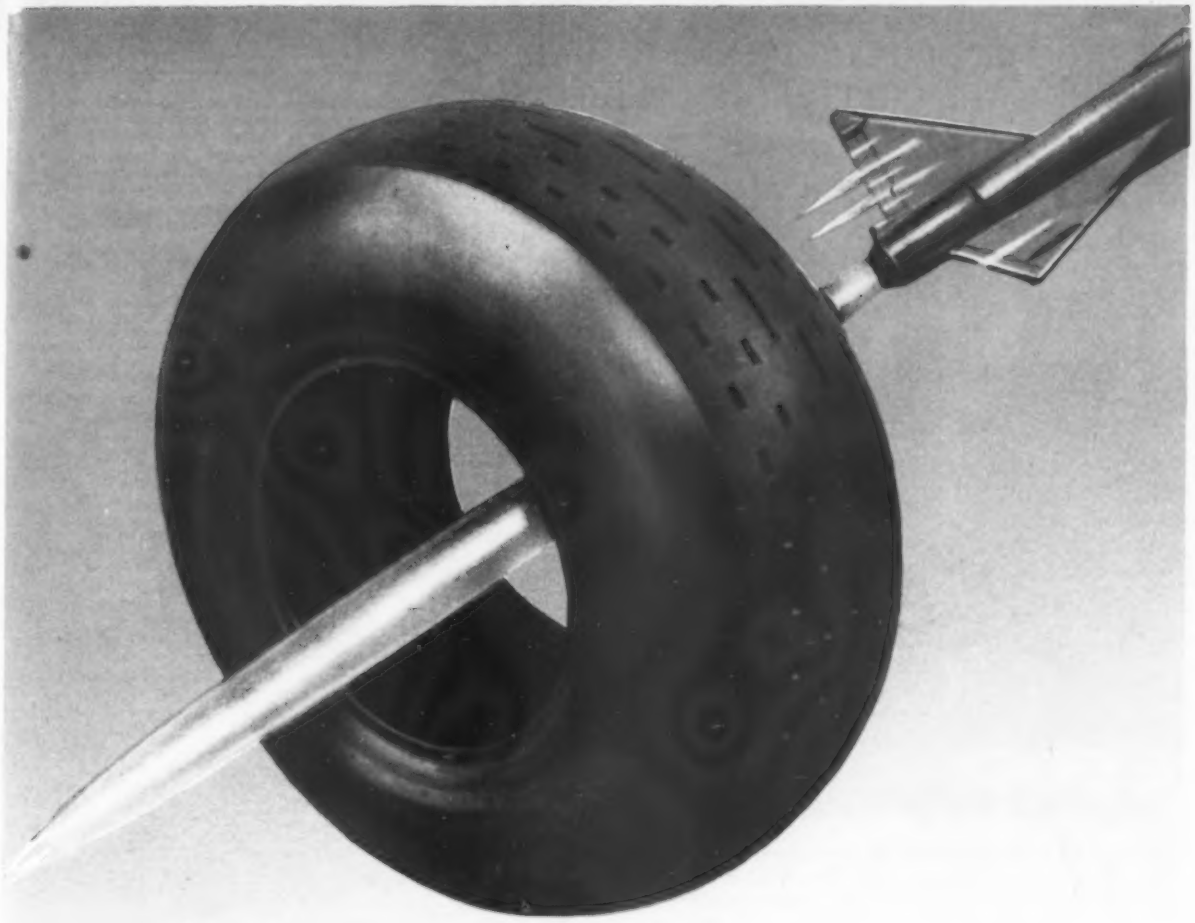

Thompson is prepared today ...for the jets you fly tomorrow

Today on military jet planes, Thompson treads continue to provide unsurpassed safety and dependability. These new Thompson treads are specially designed for the greater weights and higher speeds of turboprop and jet operations. In full retread or top-cap, today's Thompson treads are the product of several years' experience in design and manufacture. They have proved superior for jet aircraft in laboratory and field tests.

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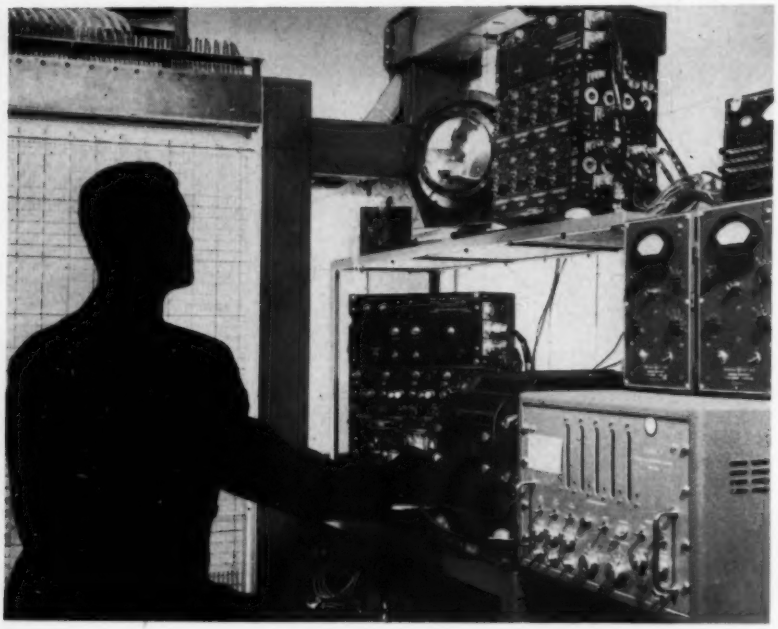
TO THE FINE ENGINEERING MIND
SEEKING THE CHALLENGING PROJECTS IN



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CONVAIR offers you an imaginative, explorative, energetic engineering department... truly the "engineer's" engineering department to challenge your mind, your skills, your abilities in solving the complex problems of vital, new, long-range programs. You will find salaries, facilities, engineering policies, educational opportunities and personal advantages excellent.

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H. T. Brooks, Engineering Personnel, Dept. 202

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When & Where

Feb. 20-22—Fourth annual Texas Agricultural Aviation Conference, A&M College of Texas, College Station, Tex.

Mar. 11—Institute of the Aeronautical Sciences national flight propulsion mtg., (restricted), Hotel Carter, Cleveland.

Mar. 20-23—Aero Medical Assn. 26th annual mtg., Hotel Statler, Wash., D. C.

Mar. 28-Apr. 1—Ninth Western Metal Exposition, Pan-Pacific Auditorium, Los Angeles.

Mar. 28-Apr. 1—American Society for Metals exposition and congress (including all-day session on aircraft and rocketry sponsored by the American Welding Society), Pan Pacific Auditorium and Ambassador Hotel, Los Angeles.

April 5-7—Radio Technical Commission for Aeronautics Spring Assembly Meeting, Los Angeles.

Apr. 16-20—American Association of Airport Executives annual mtg., El Conquistador Hotel, Tucson, Ariz.

Apr. 18-21—Society of Automotive Engineers, Golden Anniversary aeronautic mtg., aeronautic product forum and aircraft engineering display, Hotel Statler and McAlpin Hotel, New York City.

Apr. 18-22—American Society of Mechanical Engineers, 75th anniversary mtg., Baltimore.

Apr. 20-22—American Rocket Society spring mtg., Baltimore.

Apr. 24-28—Airport Operators Council annual mtg., Hotel Olympic, Seattle.

Apr. 28-30—American Helicopter Society, 11th annual forum, Mayflower Hotel, Wash., D. C.

Apr. 29—Institute of Navigation's eastern regional mtg., Friendship International Airport, Baltimore.

May 2-5—Society of Aeronautical Weight Engineers annual national conference, Hilton Hotel, Fort Worth.

May 4-6—Fourth International Aviation Trade Show, 69th Regiment Armory, New York City.

May 30-June 5—Aviation Writers Association annual convention, Montreal & Toronto.

June 12-17—Society of Automotive Engineers summer mtg., Atlantic City.

June 21-24—Joint mtg. of the Institute of The Aeronautical Sciences and the Royal Aeronautical Society of Great Britain, IAS Building, Los Angeles

June 21-24—Aviation Distributors and Manufacturers Association mid-year mtg., Breezy Point Lodge, Brainerd, Minn.

June 23-25—Institute of Navigation annual mtg., Air University, Maxwell AFB Ala.

Oct. 11-15—Society of Automotive Engineers aeronautic mtg., aircraft production forum, and aircraft engineering forum, Hotel Statler, Los Angeles.

Oct. 11-15—National Association of State Aviation Officials annual mtg., Baker Hotel, Dallas, Tex.

Oct. 31-Nov. 2—Society of Automotive Engineers transportation mtg., The Chase, St. Louis.

INTERNATIONAL

Mar. 2—Federation International des Transport Aeriens Prives (FITAP), mtg. of executive committee, Paris.

Mar. 31-Apr. 1—Symposium on Boundary Layer Effects in Aerodynamics, National Physical Laboratory, Teddington, England.

Apr. 5—International Air Transport Association technical conference, San Juan, P. R.

May 31—International Civil Aviation Organization Assembly, ninth session, Montreal.

June 10-20—International Aircraft Show, Le Bourget Airport, Paris.

Aug. 30—International Civil Aviation Organization air navigation conference, Montreal.

Viscounts increase traffic 25% to 30%*

Passenger appeal important factor in purchase of 82 Viscounts by Capital and Trans-Canada Air Lines

With a record of almost 2 years of satisfactory operation and over 15,000,000 airline miles, the turbo-prop Vickers Viscounts will soon be flying United States and Canadian routes for Capital Airlines and Trans-Canada Air Lines.

The world's first propeller-turbine airliner, the 4-engine Vickers Viscount, owes its popularity with passengers to *definite advantages* that all experienced air travelers can *see, feel and enjoy!*

FASTER FLIGHT TIMES... The Viscount has trimmed schedules for major airlines by as much as 30%.

GREATER RELAXATION... The Viscount's remarkable freedom from vibration and noise allows passengers to sleep comfortably or converse effortlessly.

PANORAMIC VIEWING... The largest windows in any commercial aircraft add passenger comfort and pleasure.

Behind the Viscount stand the great name and service organization of the Vickers Group—internationally famous as general engineers and as makers of ships, industrial machinery, heavy tractors and precision equipment.

**The entire Air France network in Europe is now being flown by Vickers Viscounts. Air France reports: "Experience has shown that when Viscounts are introduced, traffic almost automatically increases by 25% to 30%."*

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An important announcement from General Motors to America's Aviation Industry and all who travel by air

IT has always been the aim of General Motors to supply America with the most efficient and dependable motive power for all types of transportation.

In motor vehicles, in locomotives and in many types of work and pleasure boats, GM gasoline and Diesel engines have long enjoyed the confidence of millions of people who depend upon them in their daily travels.

★ ★ ★

NOW General Motors is introducing to commercial aviation a new American-designed power plant and propeller which promise the same long step forward in passenger travel by air that GM has provided in other forms of mass transportation.

This new power plant is the Model 501 Turbo-Prop engine with matched Aeroproducts propeller, both produced by our Allison Division.

Behind each of them stand thousands of hours of military experience which has advanced engine and propeller development to a point of readiness for the passenger-flying public. This is a classic example of the benefits to the nation and the public which result from close cooperation between the Armed Forces and American industry.

Turbo-Prop power means a gas turbine engine similar to a jet, but with its tremendous power harnessed to turn a propeller.

The big advantage of the Turbo-Prop engine is that it uses less fuel than a jet, yet it enables aircraft to travel faster with *greater payload* than any other propeller-type engine.

The Allison Model 501 is the most efficient Turbo-Prop engine for its size and weight ever built in this country or abroad. It delivers more power than piston engines of twice its weight.

It incorporates all the knowledge that Allison has gained in building gas turbine engines that have *flown* more than five million hours — more flight experience than has been accumulated by any other turbine engine manufacturer — *experience in the air where it counts most.*

The military versions of the Allison Turbo-Prop already power eight different types of Navy and Air Force aircraft, including the new Vertical Take-Off Interceptors.

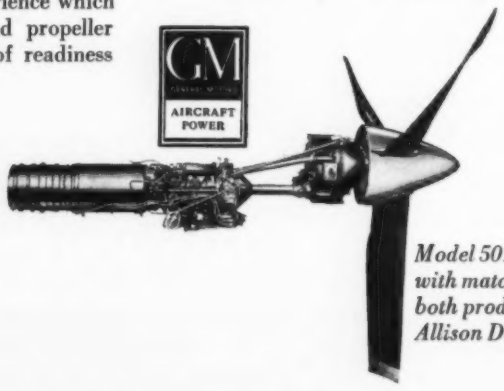
Now being readied for commercial use, the Allison Turbo-Prop will enable America's airlines to carry heavier payloads, maintain faster schedules, use shorter runways, and to offer passengers a far smoother, quieter, more comfortable ride.

While this Allison Model 501 engine can be installed in today's airplanes, the aircraft industry is busy designing new airframes to take fullest advantage of its performance.

General Motors is proud that its wide experience in engine design is paying off in this important contribution to the progress of American-built-and-powered aircraft for both military and commercial service.

Harlow H. Curtice

HARLOW H. CURTICE
President,
GENERAL MOTORS CORPORATION



Model 501 Turbo-Prop Engine with matched Aeroproducts Propeller, both produced by Allison Division of General Motors.

AIRTRENDS

Washington, D. C., Feb. 14, 1955

NEXT CHAIRMAN OF THE JOINT CHIEFS of Staff may be General Nathan F. Twining. Next JCS chairman would come from the USAF, according to an unwritten agreement covering rotation of this office between services, and air power proponents are pushing Twining for the post. Twining's term as Air Force Chief of Staff expires in June.

INVESTIGATION OF NAVY PLANE PROCUREMENT planned by House Armed Services Subcommittee fizzled after Navy Secretary Thomas indicated complete satisfaction with present deliveries.

Navy's Lesson Was Expensive. Thomas testified that about 1,000 planes costing $1 billion had been cancelled because they "could not perform to specifications." Cost of contract terminations was $227 millions.

Net Result: Navy's 1956 request for new money to buy airplanes is $750 millions vs $1.9 billion during the current fiscal year. The "deobligated" money resulting from cancellations will be used for other plane types.

WEST COAST AIRFRAME MANUFACTURERS have apparently lost their battle to get Air Force approval of management incentive programs. Pentagon has directed procurement personnel "to exclude considerations of management incentive plans in negotiation of new contracts" on the basis that they "are not proper costs under Defense Department contracts."

MAJOR STRIDES ARE BEING MADE in efforts to make combat aircraft independent of large airfields. Bell's VTOL design is latest addition to the hardware implementing this approach. Convair and Glenn L. Martin Co. are prominent in program with their water-based RAY assault transport and jet-powered Sea-Master mine layer, while Lockheed and Convair have their VTO fighters.

Combat potential of these types differentiate them from earlier efforts in this direction which were primarily support aircraft. New convertiplanes by Bell and McDonnell and a whole series of assault-type helicopters round out the picture.

AIR FORCE EXPANSION IS TAKING MAINTENANCE costs along to the tune of $3 million per day or $103 per flight hour. Maintenance personnel now represent 28.4% of all AF personnel.

ELECTRONICS STAFFS OF BASIC AIRFRAME manufacturers are expected to double their engineering employment by 1959. Present level: 6000 engineers. Eight Los Angeles firms supplying radar to the military services have a $335 million annual gross, according to a Gilfillan Bros. spokesman.

GREATER SELF-SUFFICIENCY IS BEING URGED for Canada's aircraft industry which today employs 60,000 people, 75% of the World War II peak employment of 80,000. Canada has a 20,000-lb.-thrust engine, the P.S.13, as well as new missiles of its own design under development. Previously the Avro CF100 fighter and its Orenda engines were the two principal original pieces of military equipment in production there, other than the de Havilland Beaver and Otter support aircraft.

U. S. designs, including the North American F-86 and T-6, Lockheed T-33, Grumman S2F, and Beech T-34, have been the mainstays of Canada's aircraft industry.

SEAT-MILES INCREASE AS AIRLINERS GROW LARGER

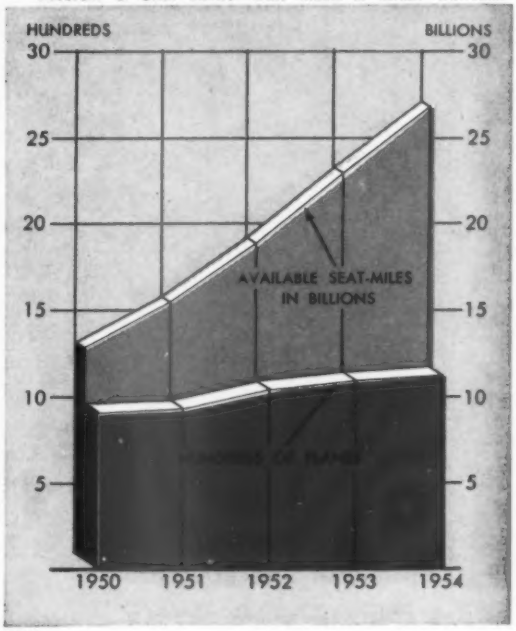
LARGER, FASTER AIRCRAFT have made it possible for U.S. trunk and local service airlines in the past four years to more than double the number of seat-miles they have to offer while increasing the number of aircraft by only about 20 percent.

Between 1950 and 1954, available seat-miles on the airlines climbed sharply from 12.9 billion to 26.7 billion. In those same four years, the U.S. domestic airline fleet, both trunk and local carriers, went up about 200 planes, as can be seen on the chart (right).

Actually, the number of airline aircraft is not a significant figure. In the four-year period the composition of the domestic fleet changed more than the increase in numbers of aircraft would indicate. Larger, faster, four-engine equipment was substituted for twin-engine types. The twin-engine aircraft, in turn, were sold by the airlines for executive and other uses.

The figure on numbers of aircraft perhaps would have shown no growth at all, or might even have been reduced, had it not been for the expansion of airline service to smaller cities between 1950 and the end of 1954.

Aircraft & Seat Miles—U.S. Trunk & Local Carriers.



DEFENSE CUT DOES NOT AFFECT RESEARCH AND DEVELOPMENT

SEARCHING FOR NEW AND BETTER WEAPONS is an expensive business, according to data from the Aircraft Industries Association and as revealed in President Eisenhower's recent budget message.

Each year since 1950 government spending for such purposes has topped a billion dollars. The peak came in 1953 as a result of the Korean conflict. Currently, government spending on research in the interests of national security is leveling off at about twice what it was in 1950.

The chart (right) makes a distinction between a total of Department of Defense and Atomic Energy Commission expenditures (R&D) for research and development and that portion of the total spent on aircraft, missiles, and related items.

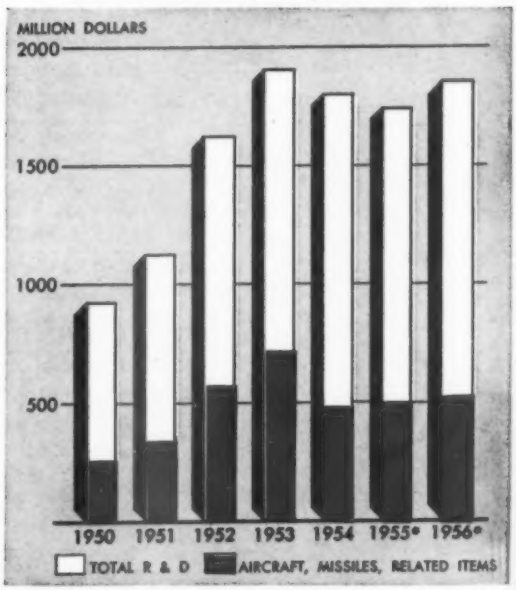
Aircraft, missiles, and related items get the second largest fraction of the total of research and development funds spent in the interest of national defense. The Atomic Energy Commission, as one might suspect, gets the largest single fraction.

Though defense spending as a whole has been reduced, money for research and development has not been reduced proportionately and, in fact, an increase is indicated for 1956.

Similarly, it may be noted that over the years research money for aircraft and missiles has been kept at about the same proportion of the total as in 1950.

Data on private spending on research and development by aircraft, aircraft engine, and other firms in the aviation industry is not available, though it is known to be sizable.

Total Federal R&D Spending vs. Aviation R&D



Source: President's budget message and AIA.
* Estimated.
Note: For 1950-1952, data on expenditures for aircraft, missiles, and related items is the total of Air Force research and development spending and the budget of the National Advisory Committee for Aeronautics.

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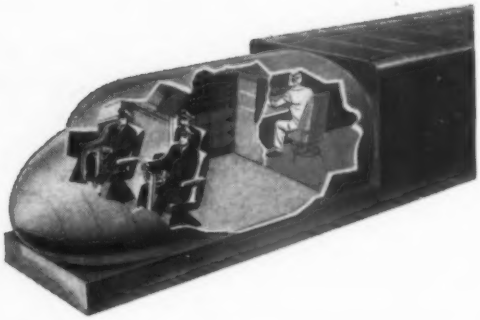

PAN AMERICAN crews will fly DC-7C's before they are delivered, using electronic SIMULATORS

From the very first flight of Pan American's Douglas DC "Seven Seas," PAA pilots and navigators will feel completely "at home," with a log of many hours of operational experience.

Such veteran familiarity with brand new equipment will be the result of Pan American's foresight in ordering the DC "Seven Seas" Simulator *ahead* of plane deliveries. For this global airline, with a Stratocruiser Simulator already in service, has long known the advantages of the Simulator over flight itself for perfecting crew efficiency.

An electronic Simulator recreates the crew compartment and controls of the airplane it represents, with blueprint accuracy. And in the DC "Seven Seas" Simulator, pilots and navigators—without leaving the ground—can fly this giant of the skies at new speeds that turn a journey into a jaunt—can cross all the oceans and continents of Pan American's worldwide routes, navigating by every modern device—can perfect take-off and landing procedures—can polish the skills that maintain Pan American's slogan of, "The world's most experienced airline."

Only through electronics is such flight reproduction possible. Only Curtiss-Wright with basic patent rights in this field, and its licensees, build Simulators and Duplicators for both the Armed Services and commercial airlines of the world.

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Fare Rise? Airline Heads Disagree

ECONOMICS is a field in which disagreements between experts are not unknown. The industry was provided with a case in point recently as one airline president warned that fares must rise and another cautioned that fares must not.

C. R. Smith, president of American Airlines, pointed to the high cost of equipment like the DC-7 and an inevitable slow-down in the expansion of business as signs that fares must increase.

"The new airplane is more efficient, but the increase in capital cost has about offset its other contributions to economy," said Smith, referring to a purchase price of about $1.7 million, compared with the DC-6B's price of about $1 million. Predicting a gradual slowing of the growth of business, he observed: "It is more difficult to increase volume 10% when the starting figure is $200 million than when it was $100 million."

DAMON

Ralph S. Damon, president of Trans World Airlines, on the other hand, came out with a warning that the carriers must "not prejudice the whole pattern and philosophy of air transportation by presuming that we can raise our fares very much . . . Success in rapidly expanding our markets has been due in large part to low costs to the passenger, and the same will apply in the future."

"The outstanding achievement in the field of aviation economics has been the introduction of the low-cost air tourist fares," he added.

Whatever the prospects for the financial future, Eastern Air Lines has found the recent past profitable enough for it to pay off two-thirds of the $175 million bill for present equipment (including 12 DC-7B's) and is ready to spend more. If an efficient cargo aircraft can be found, declared EAL chairman E. V. Rickenbacker, Eastern will invest $50 to $75 million in a fleet of them. On top of this the line is prepared to spend $200 million for passenger aircraft within the next seven or eight years.

CONTRACTS

• **Douglas Aircraft Co.** received a contract for over $128 million from the Air Force for various versions of its light jet bomber, the B-66.

• **Bendix Aviation Corp.** will provide the USAF with $1.2 million worth of motor generators.

• **United Aircraft Corp's Hamilton Standard Div.** has received two contracts for propeller assemblies, totaling $4.3 million, from the Navy.

• **Sylvania Electric Products** has been awarded a $1.2 million contract for electronic components by the Navy, bringing its government backlog close to $50 million.

FACILITIES

• **Gilfillan Bros.** has started construction of a new guided missile building in Los Angeles which will bring to 15 the number of buildings occupied by the firm. The company has a prime contract for the Army's Corporal missile.

• **TECO, Inc.,** is planning an addition to new property recently acquired in Burbank, Calif. The firm's seat business, which is almost 100% commercial, is running $250,000 a month.

• **Northwest Airlines** is planning a $100,000 expansion of hangar facilities at Seattle-Tacoma Airport to provide for all Constellation engine work except overhaul.

GENERAL

• **Air Force** reports an inventory of over $11.8 billion on the basis of its newly instituted Monetary Inventory System. Engines and electronics accounted for about $2 billion each.

• **Norden Laboratories Corp.** stockholders have approved merger with Ketay Instrument Corp. New company will be known as Norden-Ketay Corp., with Morris Ketay as president.

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PROFIT & LOSS

Firm	Period	Net 1954	Net 1953	Earnings per Common Share 1954	Earnings per Common Share 1953
Aeroquip	Qtr. 12/31	402,016	126,355	.43	.13
Contin. Aviation	Yr. 10/31	235,945	325,101	.45	.61
Litton Industries	Yr. 10/31	330,595	(Founded '53)	.63	
Menasco Mfg.	6 mos. 12/26	529 404	303 324	.41	.23
Maxon, W. D. Corp.	Qtr. 12/31	352,923	370,763	1.01	1.21
Mohawk Airlines	Calendar 1954	162 468	34,550 (loss)		
Waco Aircraft	Yr. 9/30	22,535	124,822	.15	.86

DIVIDENDS

Firm	Period	Payable	Amt.	Record Date
Amer. Airlines	Qtr.	3/1	$.875	2/15
Avco Mfrg.		2/24	.10	2/7
Boeing	Qtr.	3/10	.50	2/17
Boeing	Spec.	3/10	.25	2/17
Douglas		2/23	.75	2/2
Douglas	Extra	2/23	.75	2/2
Garrett Corp.	Qtr.	3/21	.40	3/1
Genl. Dynamics Corp.	Qtr.	3/10	1.10	2/23
Genl. Dynamics Corp.		3/10	100% stock	2/23
Grumman	Qtr.	3/21	.50	3/11
W. L. Maxon Corp.	Qtr.	3/1	.15	2/17
Pan American	Qtr.	3/11	.20	2/18
Ryan	Qtr.	3/11	.10	2/18
United Air Lines	Qtr.	3/15	.25	2/15
United Air Lines (Prfd.)	Qtr.	3/1	1.125	2/15

A. M. (Tex) Johnston (right), Chief of Flight Test, and R. L. Loesch, Senior Test Pilot, check the "707" before a test flight.

Boeing's jet transport is off to a good start

Day by day a big jet airplane is writing history in the sky over Seattle. The Boeing Stratotanker-Stratoliner has exceeded practically every expectation of its designers.

In the week following its first take-off, the 707 flew on six of seven consecutive days. By early October it had completed the entire first phase of flight tests, and today is far ahead of schedule. It handles well in the air, and fuel consumption has proved surprisingly low. Impressed by its performance, the Air Force has ordered a tanker version of the prototype airplane into production.

What lies behind the early success of this revolutionary transport? One factor is Boeing's unparalleled experience in designing and building multi-jet aircraft. Another is exhaustive research in the company's own trans-sonic wind tunnel, to achieve efficient airfoil and wing characteristics. And a third is sound production skill. The 707 incorporates many thoroughly tested features from other Boeing jet aircraft. For example, pod suspension of engines increases both safety and ease of maintenance.

The Stratotanker-Stratoliner inherits aerodynamic principles proved in more than a thousand Boeing six-jet B-47 bombers and in the eight-jet B-52 which now is in quantity production to become America's front-line heavy-bombardment weapon.

In addition, in the period since World War II, Boeing has produced more than 600 military C-97s and 56 commercial Stratocruisers. The C-97s perform almost all the aerial refueling operations of the U. S. Air Force. They also serve as high-priority personnel and cargo transports. The Stratocruisers are the acknowledged queens of transocean passenger service.

BOEING
AMERICAN AVIATION

Industry Spotlight

DE HAVILLAND OTTER: A $9 MILLION ORDER.

• USAF is ungrounding North American F-100's as they are modified to incorporate a new vertical tail and modified control system. The planes have been grounded since Nov. 11. Ungrounding followed a Phase II flight test program at Edwards Air Force Base.

• More than two million hours flying time has been logged by the 4457 Republic F-84's built for the USAF and NATO between 1947 and 1953, according to company officials. About 10% of this time, 220,000 hours, was logged during the Korean war. More than half a million of these flight hours were logged by pilots of 12 foreign countries.

• Bristol Aeroplane Co. expects to log 2000 hours development flying with the Britannia by mid-year and obtain ARB certification for the turboprop transport by then. Schedule for the four aircraft used in program: five hours a day for the prototype, 75 hours per month for the first production aircraft, 50 hours per month for the second plane (which first flew last month), a total of 250 hours during the entire program for the third production aircraft, which is scheduled to fly soon.

• Gilfillan is launching a wide-scale field demonstration tour for its new GCA Quadradar as a follow-up to the two-month program held at the Ontario, Calif., International Airport. Tour will include both military and civil airports. Gilfillan reports high interest in the new development as a result of the Ontario field test program which attracted representatives from 63 countries as well as the USAF, Navy, and CAA.

• The Army has sent its formal purchase request for 10 Cessna T-37A twin-jet aircraft to the USAF for processing. Contract is said to be for about $3,600,000 based on a cost of $360,000 per plane. Initial deliveries to the Army would not be expected for at least a year since USAF production of the intermediate jet trainer is just underway. The T-37A is powered by two Continental J69 turbojets.

• Sale of 90 DHC3 Otters to the U. S. Army has been confirmed by de Havilland Aircraft of Canada. The approximately $9 million contract is based on a unit price, including spares, of $100,000 for the single-engine plane. de Havilland is also reactivating its Chipmunk trainer production line to handle an RCAF order for 60 of the trainers at $15,500 each.

• AirResearch Manufacturing Co. has developed a lightweight refrigeration unit for the Grumman F9F-9 supersonic fighter for the Navy similar to the one the company designed for the Douglas A4D. This is the 5.8 lb. unit which has nearly twice the cooling capacity of earlier units weighing three times as much. Turbine in the unit weighs less than 2 lbs., but equals the cooling capacity of 2300 lbs. of ice per hour.

• A standard Bell 47-G demonstrator has been operating from the 8460-ft.-high Bogata plateau and the Colombian air force has used this model in rescue operations flying over 10,200-ft.-high mountains. Ricardo Olaran, sales engineering pilot with Bell, flew the demonstrator from Lima to Talara, Chimbote, Chiclayo, and Piura (Peru), then via Ecuador to Cali, Colombia, and on to Bogata, a distance of more than 1000 miles.

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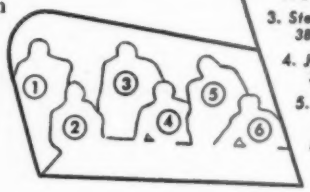
4. *John Lee* 36 years
5. *John Mattison* 25 years
6. *Harry Schaefer* 38 years



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Personal View

By WAYNE W. PARRISH

Mr. Rizley Steps Up to Bat

WHEN THE WHITE HOUSE announced February 4 that it was nominating Ross Rizley for the vacancy on the Civil Aeronautics Board, the first reactions in the aviation industry were summed up in four words: "Who is Ross Rizley?"

ROSS RIZLEY

It was a surprise nomination. There had been scores of aspirants for the job. There had been a number of specific offers made. But Mr. Rizley's name didn't enter the Washington gossip circuit until a few days before the announcement.

The new chairman (he'll be so designated after Senate confirmation) hails from Guyman, Oklahoma, a town of 4,700 far out in the panhandle of the Sooner State. But he's no stranger to the national capital, having served in Congress for eight years 1941-49, and having been both Solicitor of the Post Office Department and Assistant Secretary of Agriculture since then.

The majority of industry people had hoped for a nominee experienced in transportation or public utility regulation. But it would be wholly unfair to prejudge Mr. Rizley's capabilities even though his contact with aviation has been small. He comes to the CAB with the reputation of grass roots common sense, a capable and canny lawyer, a good judge of men and situations, and a hard-hitting administrator. He won't be pushed around easily.

One of Mr. Rizley's chief assets should be the ability to improve the strained relations of the CAB with both the White House and Congress. There are all manner of threatened investigations in both the House and the Senate, and it is no secret that the Board has not been highly regarded in the White House.

But Mr. Rizley's task will not be an easy one. Not only does he have a heap of learning to acquire in a short time about the industry and regulatory proceedings, but he is faced with healing internal strife which has become increasingly intensified in recent months. At no previous time has the Board been split in so many ways on important issues.

Member Josh Lee, for example, has become more and more rebellious in the past few months. One can sympathize with his criticism of his colleagues on slow moving procedures, but Mr. Lee has let his own impatience get the better of sound judgment. Recently he went to rather silly efforts to delay an enforcement proceeding against a large non-sked on grounds that such enforcement would delay a pending route case. The truth is that the enforcement proceeding is current and the route case is not and to pursue the former would in no possible manner delay the latter. All of this, and more, demonstrates the need for sound leadership in the Board.

We hope the Senate loses no time in confirming Mr. Rizley. If he's to be the fair hope, let's get on with the job.

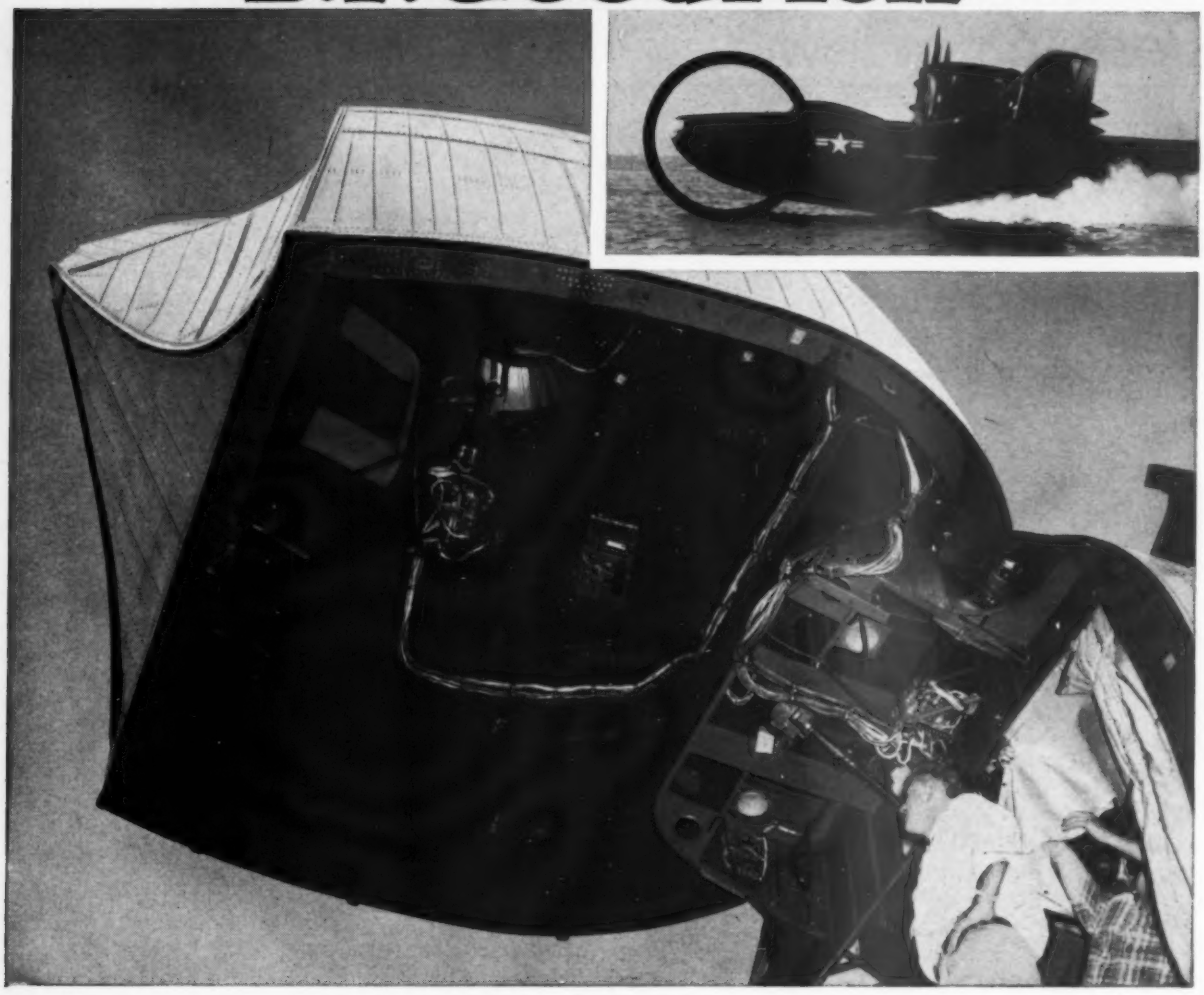
Banquet Decibels

THE HONORS NIGHT dinner of The Institute of the Aeronautical Sciences each January in New York is always a festive and welcome fixture of the aviation scene. But if we might be so bold, we'd like to suggest to the Institute management that festivity is running roughshod over the serious nature of the after-dinner program.

Not for the world would we suggest a clamping down on the industry parties before and after the dinner, but we think the Institute owes it to its speakers and honored guests to exert control over the audience for the dinner program. Those who wish to converse and joke at tables should return to the special party rooms.

The unruly nature of the most recent affair January 24 is not an unusual occurrence at such large banquets throughout the country; what makes it noteworthy is that the Institute has not adopted measures which other organizations have found necessary or desirable to bring a semblance of order out of the prevailing social chaos. Since IAS is famous for the number of awards it dispenses each year, maybe it should establish the Leonardo da Vinci Memorial Award for Reducing Hubbub at Annual Honors Night Dinners.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



How we keep a flying LST's nose out of trouble

THIS NEW Convair R3Y-2 is the Navy's airborne version of the LST. It's designed to land and taxi right up to a beach. Then lift its nose to load or unload troops, guns, trucks and even small tanks. In the early stages, nose trouble was a problem.

The bow-loader's nose had to be air-tight for flight, water-tight for take-offs and landings. Yet it had to open easily and quickly. Some kind of a seal was needed. But what kind? For the answer, B. F. Goodrich engineers came up with an ingenious seal built inside a U-shaped solid rubber base.

The 38-foot seal is attached to the nose where it joins the plane. When the nose is closed, a diaphragm that rests inside the rubber base is inflated. It lifts against the plane's body to make a 100% seal. It's like blowing up a paper bag. There's full expansion without stretch. Dangerous stretching of the tube wall (like blowing up a balloon) is eliminated. Deflated, it instantly retracts to its original position.

Extensive tests on the shores of San Diego Bay ran without a hitch. A tank could get in, yet air and water could not. A fleet of these flying LST's will see service in 1955.

This inflatable seal is another example of B. F. Goodrich's leadership in aviation research, design and development. Other B. F. Goodrich products for aviation include: tires, wheels and brakes; De-Icers; heated rubber; Pressure Sealing Zippers; fuel cells; Avtrim; Rivnuts; hose and accessories. If you have a design problem, write or phone; *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

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Bell Shows Off New Convertiplane And Vertical Take-off Jet

BY HARRY S. BAER, JR.

BELL AIRCRAFT CORP. has just unveiled two significant aviation developments—its Army XV-3 convertiplane and its company-sponsored jet VTOL.

• **The XV-3,** rolled out in a Feb. 10 ceremony at Bell's Ft. Worth, Tex., plant, is a tilting-rotor, piston-engine convertiplane designed to combine the most useful features of the helicopter with the conventional airplane.

• **The VTOL** (vertical take-off and landing), developed at Bell's Buffalo, N. Y., plant and announced publicly Feb. 3, employs twin-jet engines which provide thrust for vertical operation and horizontal flight.

At the Ft. Worth rollout top aviation officials and ranking military officers got a close-up view of the XV-3's three-bladed combination rotor-propellers mounted near the tips of stubby fixed wings. They operate as conventional lifting rotors during take-off, landing, and low-speed flight, and as regular airplane propellers for cruise and high-speed flight.

Bell engineers pointed out that conversion from rotor to propeller attitude is a smooth, gradual operation, completed in 10 to 15 seconds. The XV-3 pilot can stop or even reverse the conversion process at any point without disrupting steady, stable flight, they added.

One of the principal advantages offered by the XV-3 is its increased forward speed over that of a helicopter. The Army labeled its speed as only "over 175 mph," but there have been indications that it may be somewhat greater.

• **In its rotorcraft role,** the four-place, medium-range convertiplane is capable of hovering, moving forward, backward, or sideward with ease, and maneuvering or landing in confined areas under gusty wind conditions.

The powerplant is a single Pratt & Whitney reciprocating engine located behind the pilot-passenger cabin in the aft section of the fuselage. A new version of the Bell skid landing gear is used. The convertiplane is 30 feet long, 13 feet high, and has a 30-foot wingspan.

It will be a number of months before flight tests on the XV-3 get under way. Exhaustive "tie-down" ground tests, plus extensive ground runs must be accomplished first to familiarize the pilot with this new mode of flight.

In describing flight in the XV-3, Bell engineers pointed out that the rotor masts, which will be vertical for helicopter operation, are tilted forward through about 90° to convert to airplane flight. Then the masts are horizontal and the rotors become propellers. In this process the lift load is transferred from the rotors to the wing.

• **After conversion,** a transmission gear shift similar to an automobile overdrive is used to reduce rotor speed and attain improved high-speed performance. There are no abrupt changes in altitude or flight characteristics during conversion.

Not only is there no loss of altitude when converting, officials emphasized, but the operation can be accomplished while the XV-3 is maintaining a steady climb. In case of engine failure, power-off conversion back to helicopter configuration can be made and the convertiplane can make an autorotation landing like a helicopter.

Developed for the Army with Army money by Bell and the Air Force's Air Research and Development Command, the primary purpose of the XV-3 program is to explore the tilting-rotor design for tactical use as an Army observation-reconnaissance, evacuation, or liaison type aircraft. In addition, the concept is being considered for AF rescue mission roles and also for potential future development in larger cargo/assault transport versions.

• **Unlike the XV-3 program,** Bell's VTOL (which was first described in the Oct. 11, 1954, issue of AMERICAN AVIATION) was built by the company with its own funds.

It is powered by two 1000-lb.-thrust Fairchild J44 turbojets, which were obtained from the AF on loan.

The Bell VTOL differs from the highly publicized Navy vertical take-off planes, the turboprop-powered Convair XFY-1 and Lockheed XFV-1, which are "tail sitters" on take-off and landing, in that the Bell plane takes off and lands in a normal horizontal position

ARMY XV-3: Rollout at Ft. Worth.

It features a glider fuselage, commercial lightplane wing, helicopter landing gear, and rotatable engines mounted on each side of the fuselage under the wing.

• **For take-off** and low-speed flights the J44's are vertical, and compressed air is ejected from the nozzles at the wing tips and tail to give pitch, yaw, and roll control. After sufficient forward speed is attained, the jet engines are rotated 90 degrees and flight control is maintained by conventional control surfaces.

This VTOL weighs about a ton, is 21 feet long, and has a wing span of 26 feet. Only the pilot can be carried in the experimental aircraft.

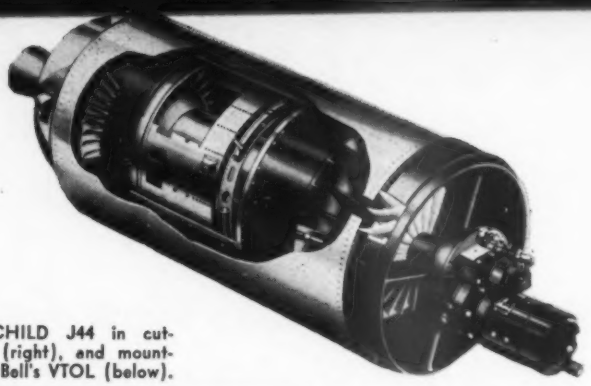
First free flight was made Nov. 16, 1954, by David W. Howe, Bell test pilot, who since has made more than 20 flights. Howe, incidently, had previous up-and-down experience as a mechanic for five years with Otis Elevator Co. He also had more than 2500 hours in fixed-wing aircraft in the AF, including combat in Europe and test piloting at Edwards AFB, Calif.

• **Importance** of the Bell VTOL was indicated in a statement by Lawrence D. Bell, the firm's president, who described it as "the most significant single development in aircraft flight since the Wright brothers' first airplane.

"We set out to prove a principle," he said, "and we are completely satisfied with the result. Our test vehicle is only the starting point. With operational aircraft of this type, military flight operations can be conducted right in the field in the same way our helicopters operated in Korea."

The Bell VTOL is the fourth officially revealed vertical take-off airplane in the U. S. Aside from the already-mentioned Navy Convair XFY-1 and Lockheed XFV-1 turboprops, the AF is sponsoring a Ryan Aeronautical Co. jet VTO, which uses the British Rolls-Royce Avon turbojet.

• **Convertiplanes,** which are not unlike VTO's, have undergone similar development. The Bell XV-3 is the third convertiplane in the U. S. which has been publicized to any degree.



FAIRCHILD J44 in cutaway (right), and mounted in Bell's VTOL (below).

McDonnell Aircraft Corp.'s XV-1, rolled out on Feb. 8, 1954, at St. Louis, Mo., uses a rotor for vertical flight, employing a pressure jet unit on each rotor blade tip. For forward flight it uses a Continental reciprocating pusher-type engine. An Army-financed project with AF assistance, the XV-1 has flown. But it has not been disclosed whether or not the McDonnell convertiplane has made any transitions from rotor to propeller in flight.

The second convertiplane is one built by Transcendental Aircraft Corp., a small company of six employees located at Glen Riddle, Pa. Like the Bell XV-3, the Transcendental plane has piston-powered rotors on the wing tips which are designed to take the plane off like a helicopter, then tilt forward to pull it like a conventional airplane. Assisted by Army funds, the company reported that the single-place convertiplane made a successful flight in December.

Thus, the Army has considerable interest in convertiplanes. Why? They can do what the helicopter can do, Army officials explain, with the added advantage of speed. In addition to providing the element of surprise, speed also enables troops to be moved safer by decreasing the time the convertiplane is subjected to enemy fire when approaching an objective. And it makes more round-trips possible per plane in any given period. Other potential uses are as reinforcement, resupply, relief, and rescue aircraft for isolated or surrounded troops.

Commercially, the convertiplane has obvious advantages for passenger and cargo flights from 100 to 750 miles, according to industry officials. Since nearly 28 million persons annually take intercity plane, train, or bus trips between 150 and 600 miles, there seems to be a market for the convertiplane. • • •

McDONNELL XV-1 CONVERTIPLANE: First military plane of its type.

NOW – ACCENT ON QUALITY

BY WILLIAM D. PERREAULT

EVEN AS CONGRESS was getting its first look at the largest peacetime request for airpower funds, the military services were taking steps to assure that the country gets the most for its money.

The theme behind Defense Department actions and policy statements was simple: In this "age of peril," which may last 50 years, the military services must depend on qualitative superiority, not quantitative superiority.

The Air Force and Navy are taking steps to implement the shift in policy brought about by airpower levels approaching their long-term goals:

• **USAF officials** disclosed that a new section will soon be added to all future contracts requiring that the airframe, engines, and equipment—the complete weapons system—meet the test of "procurability." In an address before The Institute of the Aeronautical Sciences, Otto H. Malz of Wright Air Development Center, described procurability as representing the ability to produce planes in quantity with existing facilities, machinery, and technical know-how.

• **U. S. Navy** announced that it has adopted the "Murphy Plan" for aircraft procurement which calls for a low rate of production during a plane's first three years so that it can be proved as a practical operational tool which can be pressed into fleet service without extensive modification programs, with adequate spare parts, crews that have been indoctrinated in the new problems, etc.

Backing up the first apparent steps in the new drive for qualitative superiority, Assistant Secretary of the Air Force Roger Lewis minced no words in defining the problem to the IAS: "The records show that the United States has been eminently successful in adapting its military power to take advantage of the peculiar technological character of its society. However, the same records also show that the adaptation has been accompanied by considerable friction. There have been slippages, lost opportunities, and costly errors in concept and timing," he told IAS.

The Assistant Air Force Secretary leveled his criticism at specific shortcomings:

New Defense Department Keynote

ABSOLUTE QUALITATIVE SUPERIORITY

• "Under the former policy, all our energy was concentrated on creating an inventory. Under the new policy, the emphasis is on maintaining ready forces of superior quality at all times for an indefinite period ahead . . . Up to now compromises have been forced to favor quantity. Henceforth we can afford to compromise in favor of quality, and we must do it."—ROGER LEWIS, Assistant Secretary of the USAF.

• "In the next step beyond research, i.e., development, we all too often act like the proverbial cat on the hot griddle. No sooner do we produce a breadboard model of a new piece of equipment than we lose interest, throw it at the production man, and depart on new flights of fancy . . . We frequently appear to start a new development solely for the sake of starting a new development. The performance gain in the new equipment is so minor as not to constitute a justification for the time and effort spent." REAR ADM. SELDON B. SPANGLER, Comander of U. S. Naval Air Development and Materiel Center.

• "It is not enough for us to have just better quality —we must achieve and maintain absolute qualitative superiority! This adds to the concept of the Hot War and the Cold War that of the Slide Rule War. We cannot hope to win the Cold War and avert a Hot War unless we keep on winning the Slide Rule War!"—MAJ. GEN. FLOYD B. WOOD, Deputy Commander, Technical Operations, ARDC.

• **Poor conception:** "Occasionally and usually under pressure, we have bought interesting weaponry which either did not fill a clear military need or was inadequately thought out technically. In such case, no amount of improvisation or patchwork succeeded in putting it right."

• **Indecision:** "We have frequently suffered from not being resolute and decisive in changing or terminating projects that, although sound in concept, ran into trouble as we proceeded with them—or were superseded by new developments offering better, cheaper, or faster answers to our needs . . . it is mandatory that we be firm, ruthless, and quick to halt projects which do not confirm their early promise."

• **Weapons planning and control:** "Many a fine weapon which has been produced at a great cost has worked out well, but still did not add one ounce to the air power for which it was brought. Because of some deficiency, it could not be put into the inventory as planned. . . . An airplane is not necessarily an air weapon. It must have the right engine, the right fire control, the right armament; it must work and people must know how to use it."

Throughout each of the speeches and the official actions ran the same theme—design to advanced concepts, make it as simple as the job permits, prove the concept in the early stages or act to terminate the effort, be sure it is a true addition to weaponry when it enters service, and continue its logical development to a conclusion before chasing after more elusive solutions to each new problem.

"At the very outset of a research and development project, we must also keep in mind the producibility of the desired end item," said Maj. Gen Floyd B. Wood of ARDC in addressing the Institute of Radio Engineers in Boston on electronic developments. "Will it lend itself to "Tinker Toy" construction? Is it suitable for mass production, and how long should it take to tool for it? Can we use printed circuits, transistors, and other features which simplify and lighten the equipment? Will it need scarce materials or can it be so designed as to use more abundant substitutes? What about standardization and interchangeability of parts? And will it meet the weight limitations?"

Continued Gen. Wood: "These are some of the down-to-earth questions scientists and engineers frequently overlook in their enthusiasm for a new principle or scheme." Noting the growth of aircraft electronic systems, Wood told IRE that the Boeing B-17 used 1600 lbs. of electronic gear and 100 tubes, the B-29 2100 lbs. and over 500 tubes, the B-47 5400 lbs. and 1125 tubes, and the Convair B-36 some 6000 lbs. of electronic gear including 2100 tubes.

The Air Force is not concerned about complexity of equipment, Gen. Wood said, providing there is no simpler way of accomplishing a given task, but it is concerned about reliability (which is often proportional to complexity) especially under combat conditions when normal routine and reasoning is thrown to the winds.

Rear Admiral Seldon B. Spangler had some comments to add to the related subject of proving equipment before putting it into service: "It is absolutely essential that we hold back production of our new developments until we can assure ourselves that adequate thought has been put on the simplification of the operation and maintenance features of the equipment."

Spangler had several critical comments to make regarding new developments:

• **Misdirected efforts:** "It would seem evident, therefore, that the time of those scientists we have should properly be directed toward the solution of our most pressing problems. It is not at all clear that this is being done. We spend as much time and effort on a device to inform the pilot of how much fuel he has left and what altitude and speed to fly to get home as we do on how to positively identify a snorkel through bad sea clutter. In the former case, at the expenditure of some 150 lbs. of weight, we are providing a luxurious convenience to the pilot. In the latter case we are dealing with a problem whose solution could mean men's lives and millions of dollars in ships and materials."

• **Do it yourself fad:** "It is essential that the manufacturer be in a position to interpret for the electronic designers the needs of his aircraft and to direct his efforts toward the joint solution of the airplane-electronics problem. He must be careful, however, to avoid the primrose path of taking over himself the design of electronic equipment for his own airplanes lock, stock, and barrel. No airplane builder can afford to gather the required talent under his own wing, nor can the country afford to have him do so."

• **Countermeasures:** ". . . some of the less glamorous jobs in electronics and aviation have not been given the attention that is due them. One such large area is the field of electronic countermeasures. The military man's existence is largely tied up to a continuous interplay of attack and defense, measure and countermeasure . . . I have thought, on occasion, that it should be specified that in the design of a new electronic system for aircraft, the designer must also produce at the same time a study of how his system may be countered. Certainly a designer who has paid little attention to the anti-jamming qualities of his system has done less than his full duty."

NORTH AMERICAN FJ-3 FURY: Practical application of "Murphy Plan."

• **The Navy action** in adopting the "Murphy Plan" in introduction of new aircraft, first used on the Grumman S2F subhunter and North American FJ-3 Fury, ties many of these elements together in a practical application.

Under this plan the manufacturer is given more responsibility for overall coordination of the project, including government-furnished equipment. It is a form of weapons system responsibility as used by the USAF. It is backed up by a decision to use production-type tooling for the very first aircraft instead of make-shift shop tooling, so that the production potential is always at hand if a national emergency dictated a speed-up.

Furthermore, a decision has been made to produce complex supporting equipment on a "pilot line" basis before selecting it for a specific aircraft. This should minimize the possibility of items outside the prime manufacturer's normal control influencing delivery schedules.

Under the Navy's accelerated test program, originally proposed to the Air Board two years ago by J. N. Murphy, the first six aircraft produced are assigned to the manufacturer for general performance and flight safety test demonstrations. His findings are incorporated in successive aircraft. The next seven planes go to the Navy Board of Inspection and Survey for trials, determination of contract fulfillment, and fleet suitability tests. These are followed by four more planes sent to the Naval Air Test Center at Patuxent, Md. for accelerated evaluation and development service tests.

In the case of the FJ-3 Fury, the Patuxent trials involved six airplanes and extended six weeks from Aug. 7 to Sept. 17 last year. Pilots from east and west coast carrier squadrons logged 803.4 flight hours on these planes while maintenance crews got an opportunity to evaluate the plane as an operational ship.

Only then were the planes put into fleet service and regular production schedules established. • • •

Turbojet Airliners by 1960 Is Smith Prediction

Although conceding that there will be some short-range turboprops in service in the U. S. in 1956 or 1957 and perhaps long-range types by late 1957 or 1958, better airplanes can and will be built soon thereafter, according to C. R. Smith, American Airlines' president. American, he adds, is proceeding with plans to have that done.

In the long run, Smith says, it is probable that the turbojet will take the place of other types, or else obsolete them, in the early 1960's. Here's how he sizes up the future transport requirements for domestic service:

• **For short and middle distances**—a 4-engine turboprop carrying 50-60 passengers, cruising at 350-400.

• **For long distances**—a 4-engine turbojet, 80-100 passengers, cruising at 550-600 mph.

• **Possible need** for a turboprop of intermediate size and performance with 450 mph cruising speed.

Smith predicts that the small turboprop should be available for service in 1958 and the large turbojet within a year or two thereafter.

What Will Aviation Be Like in 1985?

THE NEXT 30 YEARS of aviation have been subjected to the scrutiny of a baker's dozen of scientists, engineers, and executives assembled by Trans World Airlines in connection with a $100,000 prize contest. The public has been invited to submit descriptions of what commercial aviation will be like in 1985, for a prize of $50,000. An additional $50,000 will be awarded for the best 30-word sentence about airline service today.

The group of industry leaders provided some clues for the laymen with predictions that included atom-powered passenger airliners traveling 2000 mph at altitudes above 15 miles and VTO transports for local service lines. The experts who were gathered together at New York City's Hayden Planetarium for the occasion included Dr. Wernher von Braun, chief of guided missiles for the Army's Redstone Arsenal, Hall Hibbard, vice president of engineering for Lockheed Aircraft, and Dr. Fred L. Whipple, chairman of Harvard's astronomy department.

• **"I don't think** that the 1985 commercial airliners will differ greatly in size from today's Super Constellation type," said von Braun, "but the overall design will be quite different—certainly the wing design will change . . . My guess is that airliners will use novel types of jet engines—such as the ramjet."

The rocket expert also predicted that by 1985 an instrument-carrying rocket will be circling the earth in an orbit perhaps 200 miles up, gathering data that will make possible later flights in manned rocketships.

AIRPORT IN 1985? Artists conception shows winged transport at lower right. VTO after take-off levels off like craft in background.

Hibbard, though reluctant to predict regular service for nuclear powerplants on the airlines, foresaw 50-passenger VTO transports for local service carriers, with cruising speeds of 500 mph. "The freight and cargo business will be the major revenue producer on the airlines," he predicted. "All mail and parcel post will be carried by air."

• **Nuclear power** combined with convertiplane designs was forecast by Whipple, with the possibility that passengers might be seated in the wings.

A more pedestrian note was struck by J. Geoffrey Notman, president and general manager of Canadair Ltd., who, after predicting a traffic level of 500,000 million passenger-miles per year, added: "Finally, a personal wish—I hope that the 1985 airline passenger does not have to walk through rain and snow to go on board the aircraft, and that he will get his baggage without delay after disembarking."

The 30-year theme of the predictions and the contest was suggested by the fact that TWA is this year celebrating "Thirty Years of Service."

Boeing's XB-47D Presages Commercial Use of T49 Turboprop

FIRST OF THE FAMILY of big U. S. turboprop engines, Curtiss-Wright's T49 rated at close to 10,500 equivalent shaft horsepower, emerged into the spotlight late last month in both military and civil transport circles.

As Boeing Airplane Co. started initial taxi tests with its XB-47D flying testbed for the T49, airframe manufacturers were weighing a proposal from C-W for a de-rated version of the engine to power future civil transports.

In the XB-47D, which reportedly flies as fast as a standard six-jet B-47, with twice the range, two T49's are mounted in place of four General Electric J47 jet engines at the inboard pod locations. Two outboard J47's will remain on the testbed throughout the program.

As a commercial turboprop engine, Wright is understood to be proposing a T49 de-rated 30%-40% to about 6000 eshp.

1960: What Will We Be Building?

• Here's a review of present military and civil aviation thinking . . . but an atomic powerplant could change the picture.

By ROBERT M. LOEBELSON

WHAT KIND of aircraft will the military services and the world's airlines be buying from the nation's plane builders after 1960?

Of course, no one can be completely certain. Rapid development of atomic powerplants for aircraft could change the picture suddenly. But looking ahead on the basis of present thinking, we can arrive at a reasonably good idea of the aircraft destined to be in production over the next several years.

• On the civil side, it is apparent that one or more of the jet transport proposals now in circulation by Boeing, Douglas, and Lockheed will have been ordered and be in production before 1960. And before that, one or more carriers will undoubtedly place an order for the turboprop version of the Douglas DC-7, the DC-7D, fitted with four Rolls-Royce RB-109's.

In addition, American Airlines (and probably others) will have ordered a short-range turboprop to replace Martin 4-0-4's and Convair 240's and 340's, and will choose from four-engine proposals being submitted to American Airlines by Convair, Lockheed, Douglas, and Britain's Vickers-Armstrongs, Ltd.

• The military situation will follow the same pattern as far as air transports are concerned. No one in the Air Force or Navy would be surprised if either service placed an order eventually for the L-1449, the DC-7D, one of the jet transports, or even the short-range turboprop for use by the Military Air Transport Service.

• The next generation of military fighters, succeeding the supersonic F-100, F-101, F-102, and F-104's now in production, will approach Mach 2 by using either advanced versions of present turbojets in the 10,000 lb. thrust class *(e.g., Pratt & Whitney's J57, Allison J71, General Electric J73)* or by depending on the three jets now being developed with 15,000 lbs. thrust *(P&W J75, Wright J67, GE J79)*.

Thus, the J67 will replace the J57 in the F-102B, the J79 will replace the J57 after the B-58 prototype flies, and the J79 probably will be used instead of the Wright J65 in the Lockheed F-104B lightweight fighter.

Moreover, current emphasis on vertical take-offs and landings by both the

CURRENT PRODUCTION AIRCRAFT

USAF	NAVY	ARMY	COMMERCIAL
Fighters	**Fighters**	**Helicopters**	**Transports**
Republic F-84F	Douglas F4D-1	Bell H-13	Douglas DC-6A
North American F-86D	Grumman F9F-6&8	Sikorsky H-19	Douglas DC-6B
North American F-86F	Grumman F9F-9	Piasecki H-25	Lockheed L-1049G
North American F-86H	McDonnell F3H-1	Piasecki H-21	**Lightplanes**
North American F-100	McDonnell F3H-2	Hiller H-23	Aero Commander
Northrop F-89D	North American FJ-2	**Liaison**	Beech Bonanza
McDonnell F-101A	North American FJ-3&4	Piper L-21	Beech Twin-Bonanza
Convair F-102A	Chance Vought F7U-3	de Havilland L-20	Beech E-18-S
Bombers	**Attack**		Cessna 170B
Boeing B-47	Douglas AD-5		Cessna 180
Boeing B-52	Douglas A3D		Cessna 310
Martin B-57	Douglas A4D		Mooney M-18-C
Douglas B-66	**Transports**		Piper Super Cub
Tankers	Douglas R6D		Piper Tri-Pacer
Boeing KC-97F	Lockheed R7V-1		Fletcher FD-25
Trainers	Convair R3Y		**Helicopters**
North American T-28A	Convair R4Y		Bell 47
Convair T-29	**Trainers**		Sikorsky S-55
Lockheed T-33A	Lockheed TV-2		Hiller 12B
Beech T-34A	North American T-28B		
Cessna T-37A	Beech T-34B		
Helicopters	**Helicopters**		
Bell H-13	Bell HSL-1		
Sikorsky H-19	Kaman HOK-1		
Transports	Sikorsky HSS		
Douglas C-118	Sikorsky HR2S		
Fairchild C-119	**Patrol**		
Lockheed RC-121	Martin 5PM-2		
Fairchild C-123B	Lockheed P2V-7		
Douglas C-124C	**Reconnaissance**		
Convair C-131	Lockheed WV-2		
Reconnaissance	**Antisubmarine**		
Lockheed RC-121C	Grumman S2F		
Rescue			
Grumman SA-16			

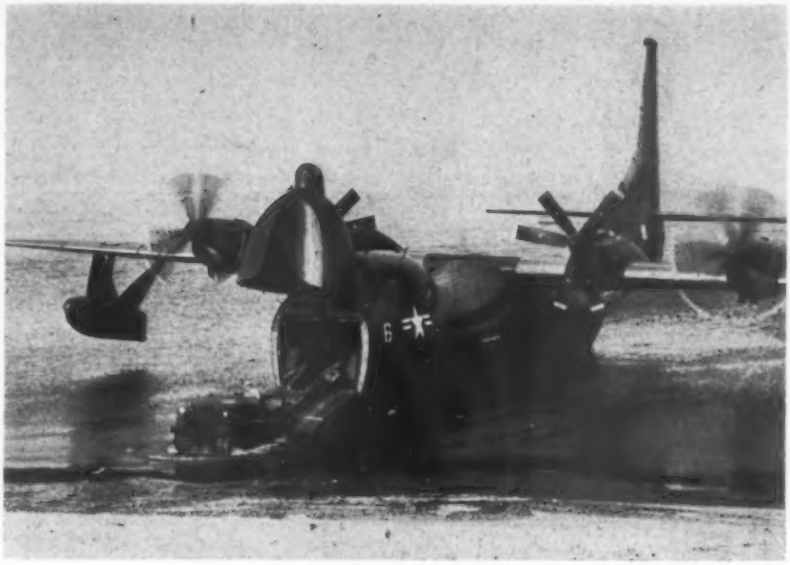
ORDERED INTO PRODUCTION

(Still To Be Delivered)

USAF	NAVY	ARMY	COMMERCIAL
Fighters	**Fighters**	**Helicopters**	**Transports**
Lockheed F-104A	Chance Vought F8U	Sikorsky H-34	Lockheed L-1449
Republic F-105A	Douglas F4D-2	Sikorsky H-37	
North American F-107	**Trainers**	**Liaison**	
Bombers	Lockheed T2V	de Havilland C-137	
Convair B-58			
Tankers			
Boeing KC-135			
Transports			
Lockheed C-130			

LIKELY TO BE ORDERED

USAF	NAVY	ARMY	COMMERCIAL
Fighters		**Helicopters**	**Transports**
Ryan VTO jet (F-109?)		Piasecki H-16 with turboprops	Douglas DC-7D
Bombers			Douglas DC-8
Supersonic 10,000-mile range aircraft			Advanced Boeing 707
Transports			Lockheed L-193
Douglas C-132			
Tankers			
Winner of Douglas-Lockheed-Boeing competition entry			
Helicopters			
Piasecki H-16 with turboprops			



R3Y-2 TRADEWIND: A fleet for the Navy by Convair.

Navy and Air Force *(Lockheed XFV and Convair XFY turboprops, Ryan's Model 69 jet)* makes it probable that some type of VTO aircraft will go into production before 1960, possibly an advanced Ryan jet designated F-109.

• **Also the subject** of much military discussion these days is the need for a huge turboprop-powered airfreighter capable of carrying a 100,000-lb. payload. Since the only aircraft in this category known to be under development is the Douglas XC-132 *(powered by four 15,-000-hp P&W T57's)*, it seems logical that Douglas can expect a production order for a C-132.

• **With the B-52** (subsonic and with a range of more than 6000 miles) already in production and with the B-58 (supersonic but also without intercontinental range) on order, there remains a long-range gap, i.e., there is no bomber currently ordered which can fly 10,000 miles non-stop at supersonic speeds without refueling.

Perhaps jet tankers and/or long-range air-to-ground guided missiles eliminate the need for such a bomber.

• **The helicopter field** is still one which has a great future which will arrive any day, both militarily and on the civil side. At present, however, observers feel safe only in predicting that the Army and the Air Force will have a requirement for the 40-passenger Piasecki H-16, in all probability one which uses two Allison T56 turboprop engines. • • •

B-57 LIGHT BOMBER: Night intruders for the USAF by Martin.

PROCUREMENT NOTES

• **Progress payments may again become** a controversial topic. The Contract Finance Committee at the Pentagon, after more than a year of discussion, is reported ready to agree on a standard contract clause to be mandatory for new contracts and to replace all progress payment clauses in present contracts by amendment. A new form to be used by contractors when requesting payments was designed to "prevent overpayments" and will be used for all three services.

• **Implying that many disbursing** officers are lax and that many contractors are operating entirely on federal funds, detailed instructions are now going out from each of the services to their field offices calling for "prompt assertation and collection of debts owed by contractors." Pentagon officials state that this action is a result of Secretary Wilson's concern over the amount of losses due to defaulting contractors.

Indebtedness examples include damages incident to defaults in performance, breach of obligations in progress payments, delinquency in rentals, expense of correction of defects, retroactive price reductions due to price redetermination, and billing errors.

• **Chairman Vinson of the House** Armed Services Committee did not catch the Navy unprepared when he suggested that a subcommittee investigate the contractual procedures of the Bureau of Aeronautics. A quiet survey and analysis of aircraft contracts has been under way for several months. Particular attention has been given to incentive-type contracts with "unrealistic target prices."

• **Before paying federal income** taxes military contractors operating in emergency facilities and receiving payment therefrom should ask for copies of their payment certificates (Section 168 (g) of Internal Revenue Code of 1954 regarding payment for the unamortized cost of emergency facilities). These are also useful in event of a terminated contract. Recent orders require Defense Department to send originals to Internal Revenue Bureau. Amounts reported will not come under income for tax purposes. Procedure: Ask contracting officer to request copies through regular channels.

Douglas B-66 takes off for test run. Defense includes G-E armament system shown in photo above.

B-66 is first tactical bomber with radar controlled defensive armament system

The U.S. Air Force's latest twin jet bomber, the Douglas B-66 will be the first tactical bomber defended with General Electric's MD-1 fire control system. First flown in June last year, the B-66 is capable of carrying atomic bombs.

Like other G-E designed and produced defensive armament systems currently in operation, the new B-66 system is composed of control equipment, and a tail turret mounting two guns.

PROVIDES AUTOMATIC PROTECTION

A similar system, now installed on the B-47, operates as follows in performing these functions as a "packaged" tail defense.

- Automatically warns the gunner on an enlarged radar screen of approaching aircraft.
- Automatically tracks and positions the guns on selected target by means of radar.
- Continuously supplies windage, ballistics and lead corrections by means of an electric computing network.
- Fires guns electrically under control of the gunner.

HOW SYSTEM OPERATES

Briefly, here's how the system operates: When the B-47 enters a danger area, the gunner switches the radar to "search" and adjusts the system control panel to provide the computer with air temperature, altitude and air speed information.

When the radar picks up an attacking plane, a bright spot shows on the screen. By means of a control handle, the gunner easily moves the radar antenna until it is centered on the target. Once the target is "acquired" and the radar is "locked on," the target is tracked automatically.

Radar then supplies the computer with the position and range of the attacking plane. Necessary gun deflections and corrections are computed automatically. When the hostile aircraft enters gun range, the gunner presses a trigger which fires the guns electrically.

If you would like more information on the MD-1 fire control system and are cleared to receive classified data, contact your nearest G-E Apparatus Sales representative.

General Electric Flowmeter includes l. to r. power supply, indicator, and transmitter.

Mass flowmeter system aids pilot two ways

Why measure the mass of fuel? The heat content of jet engine fuel is based upon the weight rather than the volume. This means that the specific gravity varies widely with the type of fuel and the temperature. Only a measurement of the actual mass of the fuel being used at the time it is being used can give you an accurate measurement of the fuel consumption. A measurement of the volume of fuel flow allows a varying degree of error dependent upon the specific gravity of the fuel being used.

MEASURES RATES OF FUEL USED

G.E.'s mass flowmeter systems provide an individual or total rate indication for one to eight jet engines and aid the pilot or flight engineer two ways:

1. Simplifies the computation of total fuel remaining.
2. Permits a running evaluation of engine operating efficiency through comparison with the pilot's other "experience data" (altitude, flight, speed, etc.). In addition, a total rate signal may be fed into automatic cruise control systems.

For more information on how this system aids pilot and plane designer, check "A" on coupon for bulletin GEC-932.

Direct engine pad mounting is permitted by the small outline and light weight of the General Electric ball piston drive. The a-c generator is coupled directly to the drive.

Smallest and lightest A-bomber yet revealed, the Douglas A4D Skyhawk uses the General Electric 9 KVA ball piston constant speed drive.

G-E constant speed drive selected for bantam A-bomber

Requiring high performance, plus an extra weight and space reduction on the design of the A4D, Douglas chose the General Electric 9 KVA ball piston constant speed drive for a-c power supply.

The flexible nature of the G-E drive permitted incorporation of an engine starter adapter, and furnished engine starting and a-c power generation from a single pad. More reliable performance is provided by the simple mechanical operation and small number of rotating parts of the ball piston units.

For detailed information on how the G-E ball piston drive can be designed for your specific needs, contact your nearest G-E Apparatus Sales Office.

Send coupon below, and check "C" for a new bulletin, describing the many features of the G-E hydraulic constant speed drive.

New right angle lead capacitors are specially designed for printed circuits

These subminiature metal-clad tubular capacitors with right angle leads are new additions to General Electric's subminiature line. The leads are welded to the silicone bushing stud at right angles rather than axially.

Especially suitable for printed circuit applications, the dimension between leads can be determined accurately for each case size required with assurance that every metal-clad tubular received will be within close specified manufacturing tolerances.

Because the leads do not have to be bent during assembly, there is less chance of breakage and leakage. The welded "right angle" leads will withstand the same rigorous shock, vibration and pull requirements as the axial leads.

These right angle lead capacitors are available in a full range of ratings for 85° C and 125° C operation.

Check "B" in coupon to receive GEC-987A for further information on this new line.

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- ☐ "C" Hydraulic Constant Speed Drive, GEA-5979

Name..... Position.....

Company..... Project.....

City..... Zone..... State.....

Pentagon's New Policy on Depreciation

A NEW POLICY on depreciation of contractors' plants and equipment is expected from the Pentagon shortly.

A directive will be issued soon, reports indicate, and new regulations will be incorporated in revised cost allowance principles of Section XV, Armed Services Procurement Regulations.

Generally following the principles of the new tax law which permits a declining balance instead of the old mandatory "straightline" system, the new policy will include these points:

• **Any system** of accelerated amortization permitted by the Internal Revenue Bureau for tax purposes will be acceptable to the Defense Department.

• **Any approved system,** once adopted, must be continued and not changed from year-to-year to "accommodate" the contractor's earnings.

• **Full consideration** will be given to depreciation already made under federal income and excess profits tax laws and under renegotiation.

First drafts of the rules contained emphatic wording specifically prohibiting "double depreciation," but this was eliminated in favor of simple business language. However, authorities stated that the rules will be strengthened if any "end runs" are attempted around the new regulations.

Wording of the new regulations, now receiving finishing touches in the office of Wilfred J. McNeil, Assistant Defense Secretary (Comptroller), contains the following references:

• **Depreciation** is a charge to current operations intended to distribute the cost of tangible capital assets, less estimated residual value, over their estimated useful life in a systematic and logical manner. It involves a process of allocation, not valuation. Useful life has reference to the prospective period of economic usefulness in the particular contractor's operations, as distinguished from physical life.

• **Depreciation** on a contractor's plant, equipment, and other capital facilities is an allowable element of contract cost, provided the amount thereof is based upon original cost. It should usually be allocated to the contract and other work as an indirect cost.

• **Charges for depreciation** on idle or excess facilities will not be allowed except on such facilities as are reasonably necessary for contract performance standby purposes.

• **Unless otherwise provided** in the contract, no use charge will be allowed on assets still in use which have been, in accordance with the contractor's consistent accounting practice, fully depreciated on the contractor's books.

• **Where the contractor** has applied for and received a determination of "true depreciation" from the Emergency Facilities Board covering emergency facilities acquired under certificates of necessity, the amounts so determined for "true depreciation" over the emergency period (five years) will be recognized in lieu of normal depreciation.

After expiration of the emergency period for the facilities concerned, where a determination of true depreciation has been made, the remaining undepreciated portion of the cost of such facilities will be depreciated over its remaining useful life and will be the only amount recognized as allowable cost. The contractors may elect to use normal depreciation rather than true depreciation determined by the Emergency Facilities Board. However, the method chosen must be followed consistently throughout the life of the emergency facilities.

It was also noted that earlier drafts of the depreciation section contained phraseology designed to close a loophole which has caused federal auditors considerable trouble in recent years. This is the practice of some contractors selling plants to non-profit organizations, community companies, or family groups, then signing rental agreements that permit greatly accelerated amortization. The new policy covers this in a special section under Rentals of Plant and Equipment (Including Sales and Leaseback of Facilities). • • •

SKEETS COLEMAN, test pilot of Convair's XFY-1 Pogo, couldn't keep dust and propeller blast out his eyes during the canopy-open take-offs in the Navy VTO fighter, so he models a special headgear designed with eye shield that flips down.

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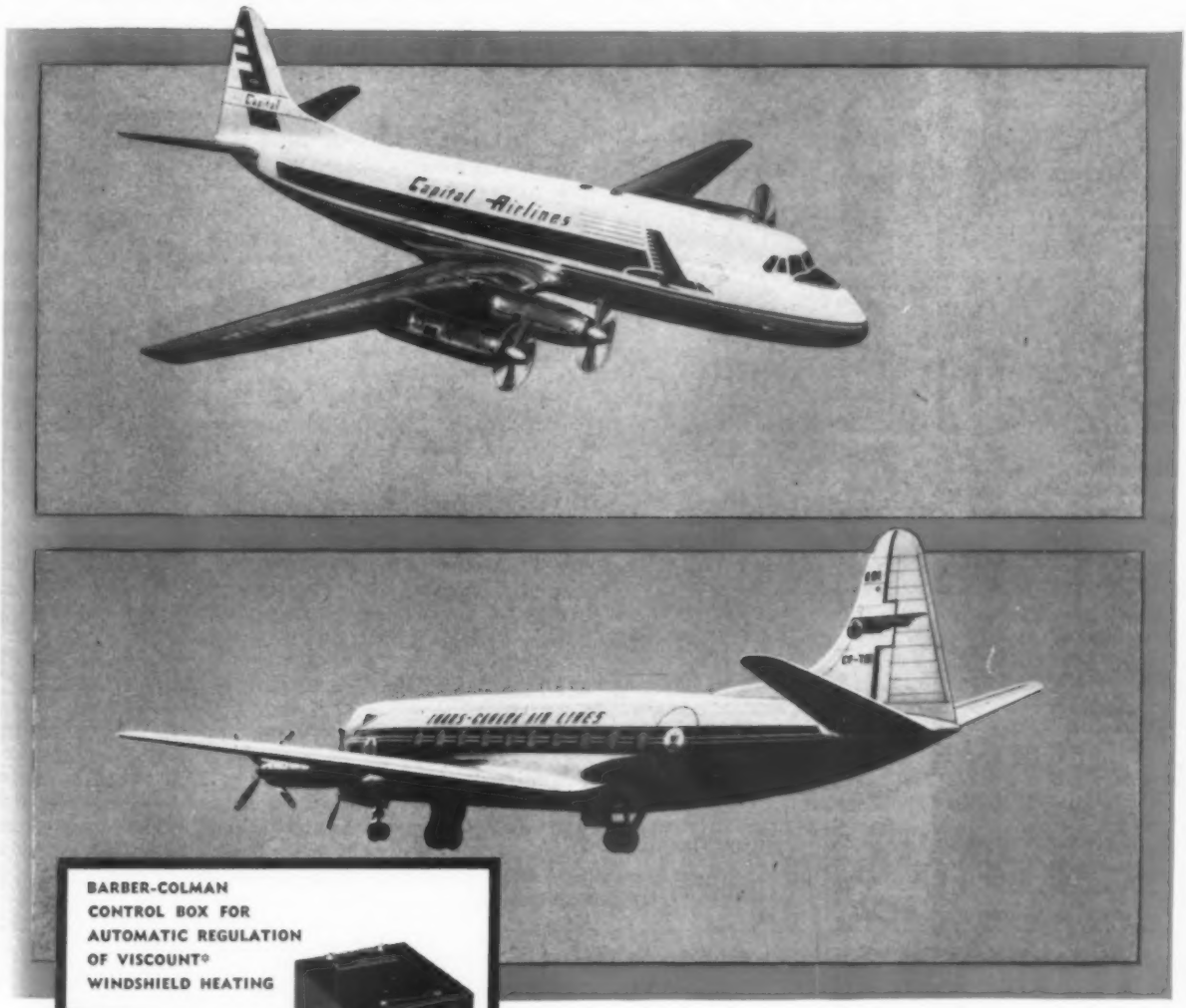

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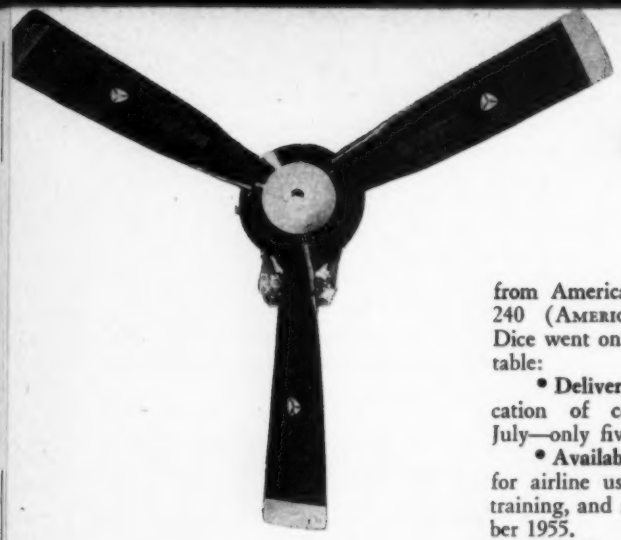


SMALL DIAMETER: Spinner hides all but bottom-mounted accessories.

Allison's Commercial Turboprop Is On the Market

UNDER IMPETUS of increasing interest in both civil and military quarters, tangible signs of a U.S. turboprop transport program are beginning to show at last. Last month, while the USAF marked delivery of its first turboprop (a Convair YC-131 powered by Allison YT-56 engines), officials of General Motors and its Allison Div. launched their entry into the commercial turboprop engine and propeller field.

Keynoting this latter event were separate announcements by Harold H. Dice, asst. general manager of Allison, and G-M president Harlow H. Curtice. They made it clear (1) that the company is prepared to make its Model 501-D10 commercial counterpart of the T-56 available almost immediately, and (2) that both technically and financially, top level G-M officials are 100% behind the commercial venture.

With the 501-D10 now being proposed by three U. S. aircraft manufacturers in competition for a large order from American Airlines for a Convair 240 (AMERICAN AVIATION, *Jan. 31*), Dice went on the record with this timetable:

• **Delivery of engines** for certification of commercial transports in July—only five months off.

• **Availability of additional engines** for airline use in service testing, pilot training, and route checkout by November 1955.

• **Production engine delivery** for installation in certified transports by March '57 with availability for airline use later that year or early '58.

By that time, Dice expects, USAF will have gained two years operating experience with the T-56 and commercial operators will have a starting overhaul time of 400 hours for the 501. He anticipates that the engine will be capable of operating with a 1000-hour overhaul period five years or less after start of commercial service.

With the military future of the T-56 engine virtually assured by its selection for the USAF's C-130 Hercules cargo transport now being produced by Lockheed-Marietta (first engines were recently delivered 80 days ahead of schedule), Allison looks to these features to sell its civil counterpart:

• **Power/Weight Ratio**—The 3750 shp rating results in a power-to-weight ratio of 2.3 to 1. This, Allison says, is better than any known turboprop engine and is a marked improvement over the 1-to-1 ratio of current piston engines.

• **Fuel Economy**—The 501's sea level static specific fuel consumption of .54 lbs./hp/hr., says Allison, is competitive with piston engines now in use and superior to any other turboprop engine that is in a similar state of readiness for commercial operation.

Dice also points to a recent comparison (by an airframe manufacturer) of the 501 versus a current reciprocating engine in a given transport:

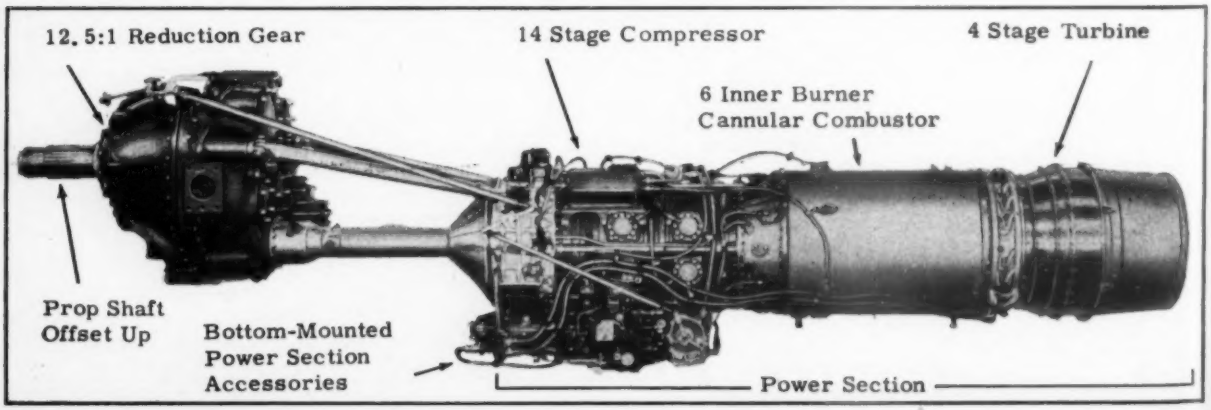
• **Saving of 2000 lbs.** weight per nacelle. The bulk of the saving is attributed to the low weight and small frontal area of the 501—its power section and gear box weigh 1600 lbs. and frontal area is six square feet. This is less than half the frontal area of piston engines now in use.

• **Total aircraft drag reduction** of 13%. Nacelle drag of the 501 represents 8% of the total aircraft drag whereas the piston-engined aircraft nacelle drag amounted to 21%.

Allison's 501 is basically an axial-flow turbine engine with a 14-stage steel compressor handling 30 lbs. per second of air at a compression ratio of more than 9 to 1. Its 4-stage turbine is connected to a 450 lb. reduction gear assembly by a 28" long shaft, with 90% of engine power output driving the compressor and propeller, and the remaining 10% converted to jet thrust.

Some distinct advantages in overhaul and spare parts programing of the 501 are to be realized from the 28" separation of its power and reduction gear sections, Allison feels. Although the basic engine will be overhauled between 400 and 1000 hours for some time to come, overhaul time for the reduction gearing will be three times that of the engine. The easy separation

LEFT SIDE VIEW: ALLISON COMMERCIAL MODEL 501.



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of the two sections should pay dividends.

With the 501 in Allison's commercial bid is the Aeroproducts Model A634FN 215 propeller, a three-bladed, 13′ 6″ diameter design that incorporates both feathering and reversing features. Although matched with the 501 engine, the A634 is not limited to this combination but is now available for use with other turboprop engines.

An attractive safety feature built into both the propeller and engine reduction gearing is a negative torque signal (NTS) system which moves the propeller blades toward feathered position if there is indication of torque reversal from the engine. It changes blade angle automatically and protects against any sudden change in turbine speed or adverse effects of wind gusts on engine operation.

Only Air Force approval of its commercial program and CAA certification of the 501 remain as hurdles in Allison's path, and neither appears to be a major problem. With the precedent set by the AF in releasing the more highly classified J57 jet engine for Boeing's civil military transport-tanker prototype, at least that phase of its plans for token engine deliveries for testing should get immediate AF sanction.

As to CAA certification, Allison recently completed its 150-hour model test with reported trouble-free operation. Although some additional testing to overcome relatively minor hot section problems is said to be getting under way, prospects look good for both military acceptance and CAA certification within the next six months. • • •

Viscount Can't Live Up To Claims—Patterson

The Vickers Viscount turboprop transport in actual operation in the U. S. cannot live up to its advance advertising, says United Air Lines' president W. A. Patterson. In a recent address, the UAL executive pointed to the danger of creating such a build-up that people will become disappointed with their actual experience even though there may be a slight improvement in comfort.

"A product can be oversold as well as undersold," he maintains. Although conceding that the Viscount represents a slight improvement in passenger comfort over the DC-6B, he doesn't think it compares to that of the Boeing Stratocruiser.

NEW BILLS IN THE NEW CONGRESS

TWO BILLS of extreme interest to the air transport industry have been introduced in Congress. One measure was introduced in the Senate by Senator Magnuson (D-Wash.) which would require CAB to grant permanent certification to local service air carriers, but carried a proviso that "the Board could name temporary intermediate points in issuing a certificate if those points have a loss record." The additional language, it is believed, was designed to override CAB's objection to "freezing" the local industry's route structure until a greater degree of stability has been achieved.

The other bill was introduced in the House by Rep. Percy Priest (D-Tenn.). The Priest bill is a so-called "off-set" measure which would require CAB to recognize different operational or geographical divisions of an air carrier in determining mail rates and subsidy. The legislation is designed to nullify the Supreme Court decision in the Delta-C&S Air Lines Case to the effect that profits of one division in excess of a fair rate of return must be offset against subsidy needed in another division.

Significance is attached to both bills because their sponsors are chairmen of the Interstate and Foreign Commerce Committees in the Senate and House, respectively. Each committee will eventually hear both bills.

Aviation bills introduced since Jan. 20 by number and subject matter and their authors are as follows (for earlier bills see AMERICAN AVIATION, *Jan. 31*):

H. R. 427	Repeal of the foreign travel tax in the Carribean area .....Rep. Fascell (D-Fla.)
H. R. 2200	Repeal of the foreign travel tax in the Carribean area .....Rep. Sikes (D-Fla.)
H. R. 3125	An exemption for agricultural cooperative shippers from the Civil Aeronautics Act and regulation of CAB .....Rep. Miller (D-Calif.)
H. R. 3325	Requires CAB to recognize different divisions of an air carrier in determining mail pay and subsidy .....Rep. Priest (D-Tenn.)
H. Res. 105	House Approved. Authorizes Committee Committee to conduct investigations and studies of all matters in jurisdiction, including civil aviation —expenses of $60,000.
H. Res. 112	House Approved. Authorizes and directs Armed Services Committee to look into all matters relating to procurement, personnel, administration of laws, and scientific research by the Department of Defense—expenses of $150,000.
S. 339	Repeal of foreign travel tax in the Carribean area. Sen. Smathers (D-Fla.)
S. 651	Require issuance of permanent certificates to local service airlines with allowance for temporary intermediate points ..Sen. Magnuson (D-Wash.)
S. 749	Permit air carriers to offer free or reduced-rate carriage to the clergy .....Sen. Capehart (R-Ind.)
S. 742	Establish a revolving fund for operation of public airports in Alaska at Anchorage and Fairbanks (by request) .....Sen. Magnuson (D-Wash.)

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AVIATION PRODUCTS

COLLINS ENTERS AUTOPILOT FIELD

• New approach to automatic control claimed with incorporation of flight director system

BY JOSEPH S. MURPHY

CLIMAXING almost two years of intensive research and development, Collins Radio Co. is making its bid to crack the highly competitive aircraft autopilot market. A pre-production prototype of its candidate—the AP-101 Automatic Flight System—has already been demonstrated to a number of major airlines. First production units being built at Cedar Rapids, Ia. are slated for delivery in early fall.

First details of the AP-101, described exclusively to AMERICAN AVIATION, show it to be an autopilot and flight director system combined. This combination, Collins feels, represents a much needed new approach to automatic control, giving the pilot a continuous and easily understood picture of what is happening when on autopilot, yet allowing him to take over and fly the same instruments as a flight director simply by pressing a button.

Coupled with this new approach to automatic control, Collins cites these added design features in the AP-101:

• **Improved Reliability** — Magnetic amplifier and transistor circuitry replaces vacuum tubes throughout. Their efficiency *(no filament power required)*, Collins says, not only results in lower power requirements for the system but also results in lower temperature rise in the electronic equipment chassis.

• **Positive Over-ride**—An independent electrical and mechanical disengaging system is provided, with manual overpowering of the autopilot possible while engaged.

• **Servicing Ease** — All sub-assemblies are built in the form of modular plug-in units. By the use of test points located at each module, the operator can locate a faulty unit and replace it with a spare without removing the complete accessory from service. Another advantage of this construction is the way it simplifies updating or modification of the system by insertion of plug-in units of interchangeable new designs.

• **Flexibility**—Use of a systems design approach in the AP-101 allows for inclusion of additional sensing elements such as rate gyros, accelerometers, advanced altitude controls, and airspeed computers as they may be required for particular airplane types.

COURSE INDICATOR

WEIGHT OF THE COLLINS AUTOPILOT SYSTEM

Overall weight of the AP-101 system is 130.7 lbs. Component weights are listed below. (*) indicates items representing the Collins FD-104 Flight Director which is part of the new autopilot.

Component	lbs.
*Appr. Horizon	2.1
*Course Ind.	4.0
*Steering Comp.	14.0
*Shockmount	2.8
*Vert. Gyro	5.1
*Gyro Monitor	.5
Pedestal Contr.	5.3
Mech. Disconnect	1.3
Computer Ampl.	29.0
Shockmount	2.7
Sensing Unit	6.3
Servo Assembly (3)	38.7
Capstan (3)	13.2
Trim Tab Servo	3.0
Capstan	2.7

The complete cockpit operation of the system is centered in three units—an approach horizon, a course indicator *(both common to Collins' earlier Integrated Flight System)*, and a pedestal controller.

• **Approach Horizon** — This gives the pilot both attitude and steering indication. Pitch and horizon bars provide the attitude information much like a standard artificial horizon. A third indication, that of a steering pointer, presents a computed signal showing what the aircraft bank angle should be to make good the desired maneuver or flight path. For example, when the airplane is rolled to the correct bank angle, whether it is on manual or automatic flight, the steering pointer centers.

PEDESTAL CONTROLLER

The signal which operates this pointer also commands the autopilot servo channels, hence under automatic control the pointer stays centered at all times except for the brief interval when it is taking up a new bank angle command.

A fourth service of the approach horizon is to show the position of the airplane above or below the glide slope during an ILS approach. A glide slope arrow moves up and down a vertical scale on the left side of the instrument face to give the pilot the same information usually provided by the horizontal needle of a Flight Path Deviation Indicator.

During an automatic ILS approach with the AP-101 system, aircraft position above or below the glide slope becomes a pitch command. When the airplane reaches the proper pitch attitude, the pitch bar continuously tracks with or matches the position of the glide slope pointer.

• **Course Indicator**—This unit combines compass heading and radio position data to present a complete picture of the navigation situation. Using a presentation identical to that of the Collins IFS course indicator, a desired VOR or localizer path is set by a course arrow. A course bar and miniature airplane then show the airplane's position and heading related to this course.

If the autopilot is set in the VOR/Localizer position, the autopilot flies the radio path of the course indicator. As an alternative, a heading marker on this unit can be set to any desired magnetic heading and the autopilot selected for "Heading Control." In this position the plane will then automatically seek out and hold whatever heading is selected.

• **Pedestal Controller**—This is the

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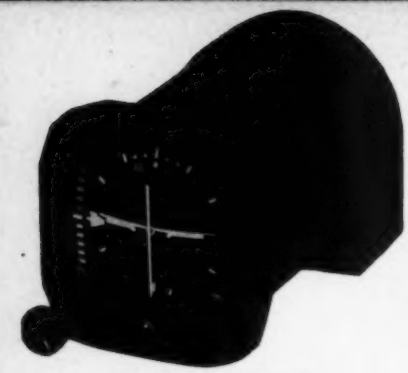

APPROACH HORIZON

center of pilot operation of the new Collins system. It houses all the controls for autopilot engagement, selection of flight functions, and maneuvers. These controls include:

Power Switch—Serves as an On-Off control as well as a means of autopilot disengagement.

Ready Light—Within 20 seconds of power switch operation this signals that the system is ready for engagement.

Function Selector—Provides for autopilot engagement, automatic synchronization, and selection of functions, all under direct control of the pilot. This arrangement, Collins feels, is much less complicated than conventional remote generator follow-up and other type circuits used to gain the same end.

Engage Light—Once the autopilot is engaged by pulling the function selector out, this light confirms system engagement. It remains on until the autopilot is disengaged.

One feature of the controller operation is a built-in integration arrangement that prevents any radical changes in attitude when the autopilot is engaged. Instead, the airplane continues to fly as it was until the pilot releases the functional control knob from its pulled position. Then as it returns slowly to its normal flush-with-panel position, the airplane smoothly starts to follow the directions of the autopilot for the flight function chosen. Circuit design in the AP-101 is such that electrical command signals are "faded in" as the knob gradually moves flush with the panel.

As an added precaution, the control cannot be accidently turned from one function to another. In selecting any one of the four control operations *(gyro, heading, navigation/localizer, or approach)* the selector must be pulled out. A mechanical lock prevents switching with the selector flush.

Here's how the system operates for each of the four functions:

• **Gyro**—The human pilot controls the autopilot, using a turn control atop the pedestal controller and pitch control wheels mounted on each side. The autopilot holds whatever attitude the pilot selects. This function is intended for situations when a pilot wants direct control during maneuvers rather than for automatic flight on a heading, altitude, or radio course.

• **Heading**—The autopilot acquires and holds whatever magnetic heading the pilot sets up with the "Heading" marker on the course indicator. If set to a heading that varies widely from that of the airplane when the function selector is released, the plane smoothly rolls into a bank (limited by a pre-set maximum bank angle) and holds this attitude until time to roll out on the selected heading.

Advantage cited for this feature is the assist it gives the pilot during such maneuvers as procedure turns prior to an ILS. Instead of herding the airplane by means of the turn control, the pilot need only select the various headings with relation to the picture he sees on the course indicator and the autopilot sets up the new flight path without further attention.

POWER REQUIREMENTS
COLLINS AP-101

For aircraft using 27.5 volts d-c: 254 watts normal and 330 watts maximum maneuvering (115-volt 400-cycle single-phase requirements are 145 va normal, 160 va for maximum maneuvering).

For aircraft having 115-volt 400-cycle 3-phase delta:

27 volt d-c, 150 watts normal and maximum maneuvering conditions.

115 volt 400 cps 3-phase, normal 110 va, maximum maneuvering 190 va.

115 volt 400 cps 1-phase, normal 145 va, maximum maneuvering 160 va.

• **Navigation/Localizer**—The autopilot receives VOR, localizer, or navigational computed radio course deviation information and flies the airplane so that the course bar on the course indicator centers. For example, when the autopilot is changed from "Heading" to "Nav/Loc" on the final leg of the procedure turn of an ILS approach, the autopilot flies the airplane along the localizer until the glide slope is intercepted.

• **Approach**—Once the approach horizon shows the glide slope is intercepted, the pilot moves the function selector to "Approach" position and the autopilot simultaneously flies the airplane on both glide slope and localizer until the pilot takes over for the landing. Automatic crosswind correction sets up the necessary crab angle to hold the localizer path.

In all except the "Approach" position, an "Altitude Hold" feature of the autopilot can be brought into operation by means of a special switch on the pedestal controller. Once in operation, the autopilot will adjust pitch attitude to hold the altitude prevailing at the time. The "ALT" switch is interlocked with the pitch control, and if the pilot rotates the pitch control to climb or descend, the altitude control automatically disengages and the switch returns to "Off." Also, if the altitude control is operating when the autopilot is moved to the "Approach" position, it automatically shuts off to allow the airplane to follow the glide slope.

Four provisions in the AP-101 allow for disengagement or over-powering:

• **Push-Button Release**—An electrical release button on both the pilot or co-pilot control wheel. Designed to fail safe, it completely unmeshes the gears in the servos at the capstans, thus leaving the control cable or push-rod system free of the servo and gear train.

• **Mechanical Disconnect**—A completely independent mechanical disconnect lever also unmeshes the gears by means of cables to each servo. It also opens an electrical interlock in the "engage" circuitry of the autopilot.

• **Power Switch**—Disengages the autopilot by turning off. The AP-101 also disengages itself if power is interrupted.

• **Overpowering**—Precision mechanical torque limit clutches in each servo normally are set to limit the forces applied to the control cables to the amount actually needed to fly the airplane. The human pilot never has to apply more than this amount of force to overpower the AP-101. • • •

Union Oil Will Not Sell Pacific Airmotive Holdings

Union Oil Co. of California has no plans for disposing of its holdings in Pacific Airmotive Corp., A. C. Stewart, vice president-marketing, has informed AMERICAN AVIATION, putting at rest rumors that such a move might be afoot.

"Union's interest in PAC is not for sale," said Stewart.

The Union v.p. said he thought rumors the oil company might bow out as majority stockholders in PAC may have stemmed from the fact two or three inquiries had come into Union regarding the possible sale of its holdings. None, he added, had reached the negotiation stage.

"Union's interest in aviation is greater today than it has ever been and we definitely intend to continue with PAC," Stewart said.

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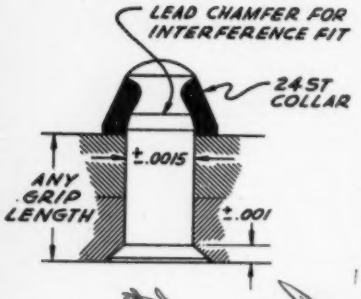

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Circle No. 16 on Reader Service Card.

West Coast Talk . . . By Fred S. Hunter

- **'Set the pace,' says the Pacer**
- **Is the Pogo wearing out Skeets?**
- **When Musak welcomed MacArthur**

SPECTATORS, lining the fences at Lockheed Air Terminal, were still "Oh-ing" and "Ah-ing" over test pilot Roy Wimmer's spectacular climb-out on the second YC-130's initial take-off, when a little Piper Pacer came sputtering down the runway, right behind, and put on the same show. The Piper's climb may not have been so fast as the big four-engine turboprop, but it was just as steep. Even the Lockheed workers in the crowd had to laugh.

• •

WOULD YOU SAY this is a hint of things to come? Hughes Aircraft Co. is installing a new environmental test chamber, which has a temperature range from —100°F to +450°, and an altitude range up to 120,000 feet. Where are we going? • •

WATCH FOR North American Aviation to start telling the world in its advertising that there are more F-86D's in use than all other USAF interceptors combined. They're still in production, moreover. And when they're phased out, North American has high hopes the Air Force will have given it the nod to phase in the F-100I.

• •

AIR FORCE Flight Test Center will be a busy place this spring. Accelerated service (Phase VI) tests on the Boeing B-52 coming up. It's for such chores as this that the test center's 10-year master plan of expansion was set up. The place keeps growing. Its personnel now totals approximately 7000.

• •

A CHAIR on transistors at Stanford University is endowed by Gilfillan Bros. You'll see industry doing more of this sort of thing in the effort to overcome the manpower problem and quicken the pace of scientific advancement.

• •

THE BIG MISSILE we've been reading about lately seems to be slowing down in speed. Three recent reports on it cited three different speeds, in this order: 10,000 mph, 9000 mph, 8000 mph. Oh, well, what's a matter of a thousand miles an hour or so nowadays? Here's another thought: Do you suppose somebody eventually will refer to this bird as the Moscow Mule?

• •

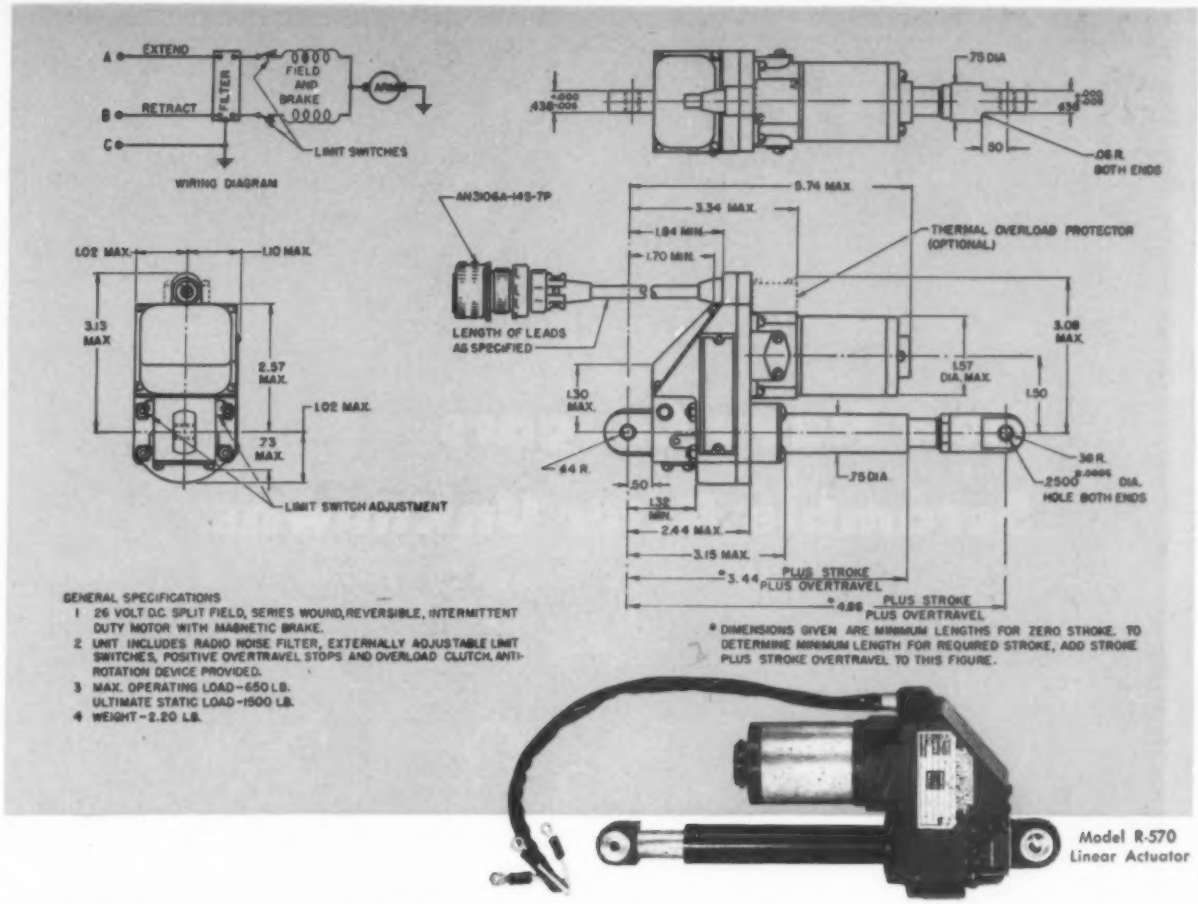
WE HEAR reports that money for procurement of new aircraft is getting tight again. One of the reasons this time is that it is costing the Defense Department so much money to modify and modernize its current equipment.

• •

CONVAIR'S talking about checking out a second pilot on the Navy XFY-1 to save wear and tear on "Skeets" Coleman. Latest reports from San Diego, incidentally, say the Marines are now taking a lively interest in the Navy's experimental VTO development.

• •

GORDON STANTON and Jack Katenhausen at Lockheed Air Terminal were practically heartbroken the other day when United Air Lines won a race with the weather at Los Angeles International Airport. The DC-7, bringing General Douglas MacArthur out from New York for the unveiling of his statue in MacArthur Park, beat the fog rolling in from the ocean by just about the length of the runway. By the time Capt. T. S. Jobson had braked to a stop at the ocean end of the runway, he was in it, and a station wagon had to come out and guide him in to the ramp. A Marine band broke out with a welcoming tune when the plane pulled up at the gate and it was just like Musak. You could hear the music, but you couldn't see the band. The Burbank Chamber of Commerce could have had a field day if UAL had had to use the Lockheed terminal as an alternate. Lockheed, need it be said, was as clear as a bell.



Model R-570 Linear Actuator

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Here are three questions to answer before you settle on any one actuator —whether it be for ailerons, feel system, cowl flaps, or any of a hundred other applications:

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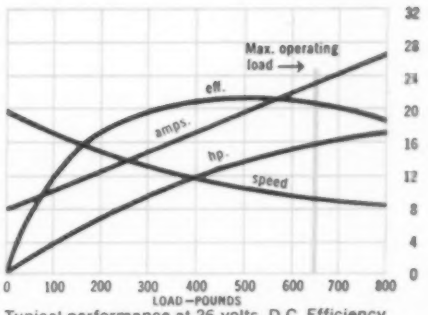
2. Is it consistent with airframe design in weight and size?
3. Will it meet your standard of reliability?

Our R-570 Linear Actuator answered these questions recently for a leading manufacturer of interceptors. In addition, his design posed the problem of extremely constricted operating space. The first R-570 was produced and delivered inside of two weeks. It may be just what you're looking for. If not, we can supply—or design—an actuator that will.



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Circle No. 26 on Reader Service Card.

New Navy Cougars Scramble After Unknowns

That plane passing over your house is being watched. If high, radar tracks it. If low, the on duty Skywatchers of the Ground Observer Corps report it to their Air Defense Filter Center.

When your Air Defense Filter Center has received two reports, the plane is tracked on the plotting table. The plane and track is then reported to the Air Defense Direction Center.

If the aircraft does not fit into the Direction Center's flight plan information, it becomes an "unknown". Now Navy fighters are also "scrambled" to intercept and identify or destroy.

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Designers and builders also of the supersonic Tiger, the Albatross amphibian, S2F sub-killer, metal boats, and Aerobilt truck bodies.

Grumman

The Navy, as part of the Continental Air Defense Command, sends land-based Cougar I's* and the new Cougar II's to intercept. The Cougar II not only is faster and has longer range than the Cougar I, but can pull a high altitude turn in half the radius. Another example of Grumman planes ready in quantity when needed.

*On April 1, 1954, the Navy proved the speed of Cougar I's by flying three coast to coast in the fastest time yet. The first made it from San Diego to Floyd Bennett Field in 3 hours, 45 minutes, 30 seconds. The other two were less than 2 minutes slower.

Agreement on Approach Lights at Last?

• USAF-CAA tests of Dutch submerged light may lead to standardization of lighting in airport over-run areas.

A MAJOR STEP toward solution of military-civil differences over what should constitute a standard runway approach light system is now taking shape. The U. S. Air Force and Civil Aeronautics Administration have agreed on a program to test the Dutch-developed Elfaka submerged light* now in use at Schiphol Airport, Amsterdam.

A liaison group appointed by the two agencies to map out the project has already recommended a test site. It remains unnamed, however, until officially accepted by the USAF and CAA.

Significance of the program is that it might provide the answer to the one major difference between the civil and AF standard for approach lights in the over-run area extending 1000 ft. out from the runway threshold. The CAA-supported standard, which is also backed by airline pilots, calls for centerline lighting from a point 3000 ft. out—up to the runway threshold.

Differing sharply with this concept, USAF breaks off the centerline lights at the beginning of the 1000-ft. over-run area. From there into the threshold, a bar of three closely spaced lights borders the left side of the area and a single row of lights marks the right side.

• **Answering recent criticism** levelled at the Air Force by airline pilots, AF lighting specialist George K. Clement told AMERICAN AVIATION that only the development of a satisfactory flush light stands in the way of major agreement with the civil standard. Reason, he explains, is that with the long, low approach that is characteristic of jet fighters it is just impossible to maintain anything but a flush light in the final 1000-ft. area.

As he describes a typical approach of the newer jet fighters, they are at about 10 ft. altitude entering the over-run area and only a foot above the ground crossing the runway threshold—all the time in a nose-up attitude.

Although USAF has three outstanding contracts in this country for development of a flush light (with Westinghouse Electric Corp., National Bureau of Standards, and Revere Electric Mfg. Co. of Chicago) Clement says there is nothing in the present state of the art that even points to ultimate development of a satisfactory flush light.

Whether or not the forthcoming AF-CAA test of the Elfaka light will change this situation remains to be seen. It has to prove both suitable *(as a light)* and usable *(one fighter pilots can see)*. Clement points out. However, regardless of the outcome of the test in solving the approach area problem, he feels that the Air Force stands to gain valuable data from the experiment on the use of submerged lighting for possible use in other airfield areas such as at runway intersections.

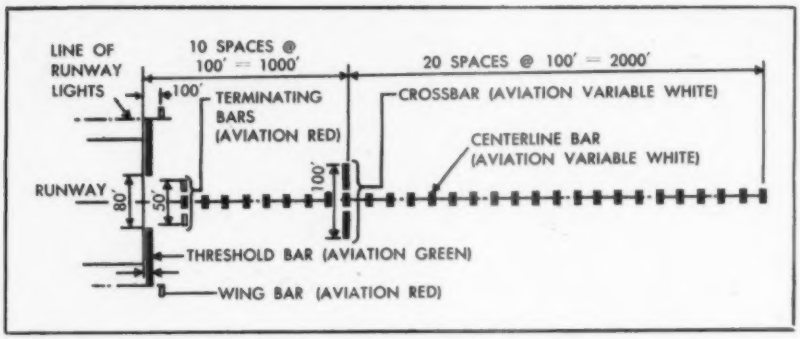
• **Cost of the Elfaka light,** he estimates, would run about $500 per fixture with another $500 for installation. If accepted by the Air Force, the ultimate layout would probably call for a bank of five closely spaced lights at eight locations along the centerline, 10 more to form the left and right wing bars *(upper diagram)*, and 22 to cross the runway at the threshold. At $1000 per unit installation, total cost would be about $72,000 with some variation higher and lower to be expected due to local terrain conditions.

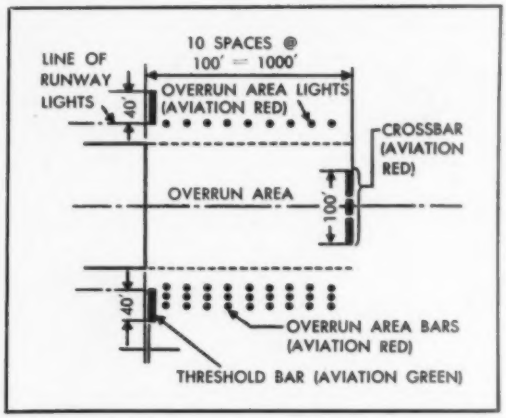
Assuming the over-run area conflict were to be resolved, the only remaining obstacle to be hurdled concerns the color of the centerline lights from 1000 to 3000 ft. out. CAA standard calls for a white centerline bar in this area whereas the AF specifies aviation red, and any agreement between the two appears beyond reach.

Here the CAA favors white simply to gain the maximum light intensity at the minimum power, figuring that any color would mean lower efficiency at the same or a higher power, and therefore more costly installation to regain the lost intensity.

• **Air Force position** is that white lights such as used by CAA are the common designator of a landing area. Although recognizing that such an indication may be perfectly all right in civil operations flown by experienced airline pilots, the Air Force feels that its pilots are not so experienced and white lighting would be dangerous.

But with the major issue in civil-military quarters strongly focused on the over-run area lighting layout and the test project to resolve it only getting under way, it is doubtful that any conclusions can be drawn before this year runs out. While this controversy holds the limelight, it is likely that the question of light color will remain unresolved for a long time to come. • • •





HERE'S THE DIFFERENCE: Civil layout (above) shows centerline lighting continued through over-run area from 1000 ft. out to runway threshold. AF over-run area (enlarged layout at left) breaks off centerline lighting at 1000-ft. mark and substitutes lights on each side.

** Produced by Elfaka Runway Light Co. of Zeist, Holland.*

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Circle No. 17 on Reader Service Card.

New Products and Processes

Carburetor Tester

A new portable aircraft carburetor tester developed by Greer Hydraulics, Inc. is designed to speed up service operations by permitting checks to be conducted with the engines running either on the ground or in flight.

The Model HCT-1 tester checks out the performance of pressure-type carburetors, such as the various models

of Stromberg Injection type, under actual operating conditions. A differential pressure gauge on the unit is connected across the air control diaphragm of the carburetor by flexible hose lines and indicates effective control pressure on the air diaphragm. In addition, an autosyn-type fuel flowmeter registers fuel consumption on the test unit flow indicator.

Circle No. 51 on Reader Service Card.

New Hinge

Hartwell Aviation Supply Co. has announced a new aircraft access panel hinge design that does not require skin cutout for installation and calls for only .450" maximum depth dimension below skin surface for installation clearance.

The Hartwell H84 and H85 hinges are completely hidden from the exterior and are adaptable for pressure-sealed doors. Lengths range from 2" to 6" in increments of 1" and fastening can be accomplished with rivets or by spot welding.

Circle No. 61 on Reader Service Card.

ATC Transponder

Union Switch & Signal Div. of Westinghouse Air Brake Co. has unveiled a commercial air traffic control transponder (radar beacon) that weighs only 27.5 lbs. and meets ½ ATR rack dimensions. A development of Melpar, Inc., Westinghouse research activity, the new transponder has been installed in six DC-3's operated by Lake Central Airlines for evaluation by CAA Technical Development & Evaluation Center at Indianapolis.

Production transponders, the company says, will conform to Aeronautical Radio, Inc. Equipment Characteristic No. 532. The unit receives on 1027 to 1033 mc and transmits on 1090 mc. Power requirements are 125 watts at 115 ± 10% volts, 320 to 1000 cycles.

Circle No. 52 on Reader Service Card.

Magnetic Amplifier

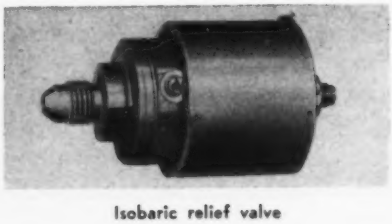
A new tubeless magnetic amplifier d-c power supply available from Engineered Magnetics is designed for airborne applications as well as laboratory bench use. Measuring 12"x7"x9" the Model EM-28-lb unit is designed to fit the space requirements of the battery it replaces.

Continuous output is 0 to 1.5 amps continuously, and voltage is easily adjusted within the range of 28—32 volts. Regulation is held to better than 0.2% with 5mv rms ripple throughout the temperature range of —30° to 120°F and at altitudes up to 70,000 ft.

Circle No. 81 on Reader Service Card.

Radar Accessories

New pressurizing system accessories announced by Lear, Inc. Romec Div. for aircraft and ground radar systems include check valves, relief valves and control switches.



Isobaric relief valve

The Romec isobaric relief valve uses a special metallic diaphragm to neutralize the effect of atmospheric pressure at altitudes so that the valve opens at the exact preset pressure.

The absolute pressure switch operates to open and close either d-c or a-c electrical circuits. Weight is 0.53 pounds.

Circle No. 82 on Reader Service Card.

Receiver Multicoupler

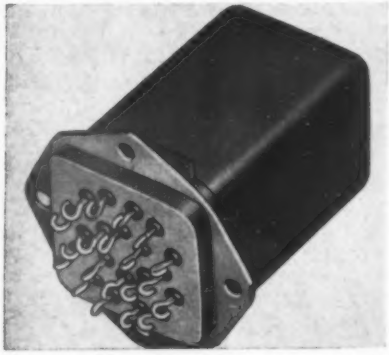
Solution to the problems of antenna space at communications centers is offered by Nems-Clark, Inc. in its new AM-1A receiver multicoupler that permits use of up to eight receivers with a single antenna.

Operating over the frequency range of 2 to 30 megacycles, the AM-1A is said to provide practically perfect isolation between receivers. Weight is 24 lbs. and unit mounts on a 19" rack requiring 7" of rack space. Operation is from 117 volt, 60 cycle a-c with 74 watt power requirement.

Circle No. 83 on Reader Service Card.

Sub-miniature Relay

A new hermetically sealed, 5-ampere sub-miniature relay now being marketed by Guardian Electric Manufacturing Co. is built to withstand 100g shock and 10g vibration from 75 to 2000 cycles per second.



The series 2005 relay meets the requirements of Spec. MIL-R-6106A Class A and MIL-R-5757B Class A. Nominal coil voltage is 24-30 volts and all contacts are rated at 5 amperes, 24-30 volts d-c resistive load. Literature available.

Circle No. 59 on Reader Service Card.

First Navy Jack, which unfurled the historic warning to the world in 1775—believed to have been first hoisted to the jackstaff of the ALFRED by one Lieut. John Paul Jones.

naval history is being made today

At 0955 on January 5th, one of the major events in naval aviation history took place.

It was the unveiling of the United States Navy's great new XP6M SeaMaster—Ship No. 1 and prototype of an entirely new concept in military aircraft.

As a component of a powerful new arm of the naval arsenal—the Seaplane Striking Force—the Martin SeaMaster focuses national attention upon a revolutionary principle of military strategy, known as the WBA* concept. Here's why:

The SeaMaster is a highly versatile 4-jet waterbased aircraft, in the over 600 MPH class, which requires no fixed base and can operate from the seas, lakes and rivers, the coastal bays, lagoons and estuaries of the world... bases unlimited!

Today the top-level talk is turning to WBA... and shown here is the reason.

*WaterBased Aircraft

MARTIN

BALTIMORE · MARYLAND

Toggle Clamps

New "trigger-release" plier-type toggle clamps marketed by Detroit Stamping Co. reportedly assure a minimum of 135,000 clamping and unclamping cycles under a 600-lb. pressure load.

The new De-Sta-Co units permit an operator to hold a workpiece with one hand and clamp and release with the other. New models are designated Nos. 482, 484, and 486. Literature available.

Circle No. 84 on Reader Service Card.

Kel-F Elastomer

Production availability of Kel-F fluorocarbon elastomer for commercial applications has been announced by The M. W. Kellogg Co. It features extreme resistance to such oxidants as fuming nitric acids, oleum, 90% hydrogen peroxide, ozone, oxygen, and weather.

Thermal stability of Kel-F ranges up to 400°F and it is said to withstand immersion in white fuming nitric acid for an extended period. Applications of the new synthetic rubber that have been tested to date include hose, tubing, diaphragms, gaskets, O-rings, tank linings, and fuel cells.

Circle No. 66 on Reader Service Card.

Lightweight Actuator

AiResearch Manufacturing Co. Inc., has developed a new "super-lightweight" aircraft actuator that weighs only 1.16 lbs. compared with 2.2 lbs. for a similar unit designed little more than a year ago. A linear type unit, it is intended for trim tab or artificial feel control systems.

Dimensions are 1.25" wide by 2.73" high. This represents a reduction from 1.9" and 3.73" for the earlier model. It will handle normal operating loads up to 150 lbs. and a static load of 500 lbs. tension or compression.

Circle No. 85 on Reader Service Card.

Servo Valve

Cadillac Gage Co. has announced production of a new servo valve that controls hydraulic flow proportionally to an input current signal. In aircraft flight stabilization systems it is said to operate satisfactorily at ambient temperatures of 250°F.

The FC-2 is a two-stage, four-way valve, the pilot stage of which is a hydraulic amplifier of the nozzle type driven by a torque motor that employs the polarized relay principle. A miniature, high force, positional feedback loop between the torque motor and main spool position encloses the nozzle stage.

Circle No. 55 on Reader Service Card.

Wire Insulation

Production of magnet wire insulated with Alkanex, a new thin-film polyester type of material with high heat,

two can do it better...

and so can dual omni!

Two on the job make any mission *twice* as easy . . . just as dual ARC Omni installations double efficiency, ease and confidence in navigation. With dual omni 15D equipment, a single pilot can make a fix *faster* . . . he can fly any omni track while also cross-checking for position. It's easier to make transition from omni to runway localizers.

With two pilots, the work can be shared for greater ease, by using both omni instruments simultaneously for different jobs.

ARC 15D Omni is compact, lightweight, CAA certified, and now employs new course indicator which combines course selector and cross-pointer meter in a single space-saving unit.

Lighten the load with ARC DUAL omni. Specification data sent on request.

Dependable Airborne Electronic Equipment Since 1928

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abrasion, and solvent resistant properties has been announced by General Electric Co. Wire and Cable Dept. A development of the GE Research Laboratory, the new wire is said to be the toughest yet developed for use in motors, transformers, and other electrical equipment operating above 105°C.

Alkanex wire, GE says, will withstand "hot spot" temperatures up to 150°C and will allow engineers to increase motor horsepower without changing motor size. It is estimated that motors once rated for 20 hp may be upgraded to 25 hp or more and that 90-95% of all motors could operate in the Class B high-temperature range for which Alkanex is designed.

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Insulated Terminal

A new compression-installed, insulated terminal developed by Burndy Engineering Co., Inc. is designed for operation in aircraft under ambient temperatures approaching 400°F.

The new terminal is of one-piece, high-strength copper construction with a nickel-plated "Thermolug" that is insulated with clear tubing extruded from special fluorocarbon polymer. It is said to meet all requirements of Spec. MIL-T-7928A with high safety margins.

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Miniature Actuator

A new actuator motor designed by American Electronic Mfg., Inc., and used in the Douglas A4D Skyhawk measures only 1.705" diameter by 2" long. It weighs 13.7 oz. and operates on 400-

cycle current with 115 volts on the fixed phase and 24 volts on the control phase.

Torque at stall is 2.9 in. oz. and no-load speed is 5100 rpm. Operating temperature range is -55°C to 90°C.

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Radio Compass

New Model ADF-15A radio compass announced by Lear, Inc., LearCal Div. is designed to meet both CAA and military specifications for direction finders. It weighs about 23 lbs. complete and includes tuner, shock-mounted amplifier, loop, and azimuth indicator.

Standard console type tuner has a frequency coverage of three bands: 190-430 kc, 480-1025 kc, and 1025-1725 kc. The amplifier features no external controls and can be mounted in any part of the aircraft. It also includes a blower for forced air cooling.

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Exhaust Components

A new exhaust collector assembly designed for use with the Pratt & Whitney R-2000 engine installation in Pan American World Airways' Hi-Per DC-3 is being produced by Ledkote Products Co., Aircraft Div.

The new design is said to eliminate socket and joint assemblies resulting in considerable increase in service life and reduced maintenance costs.

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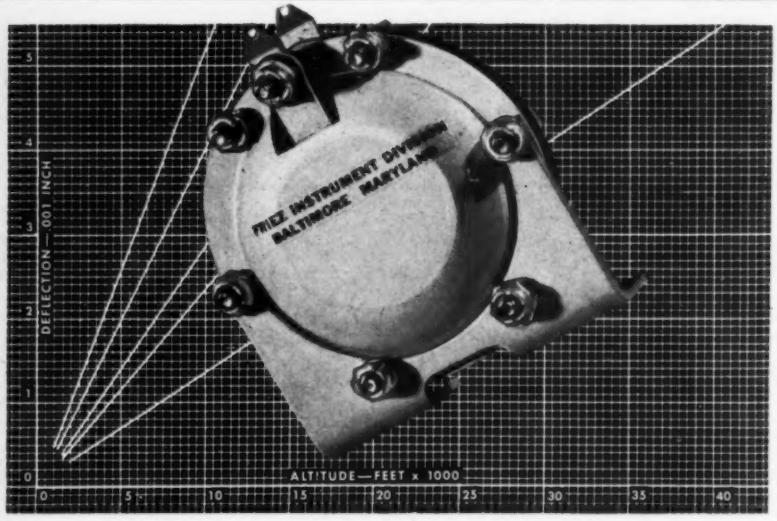

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- Minimum lag response in high velocity dives.
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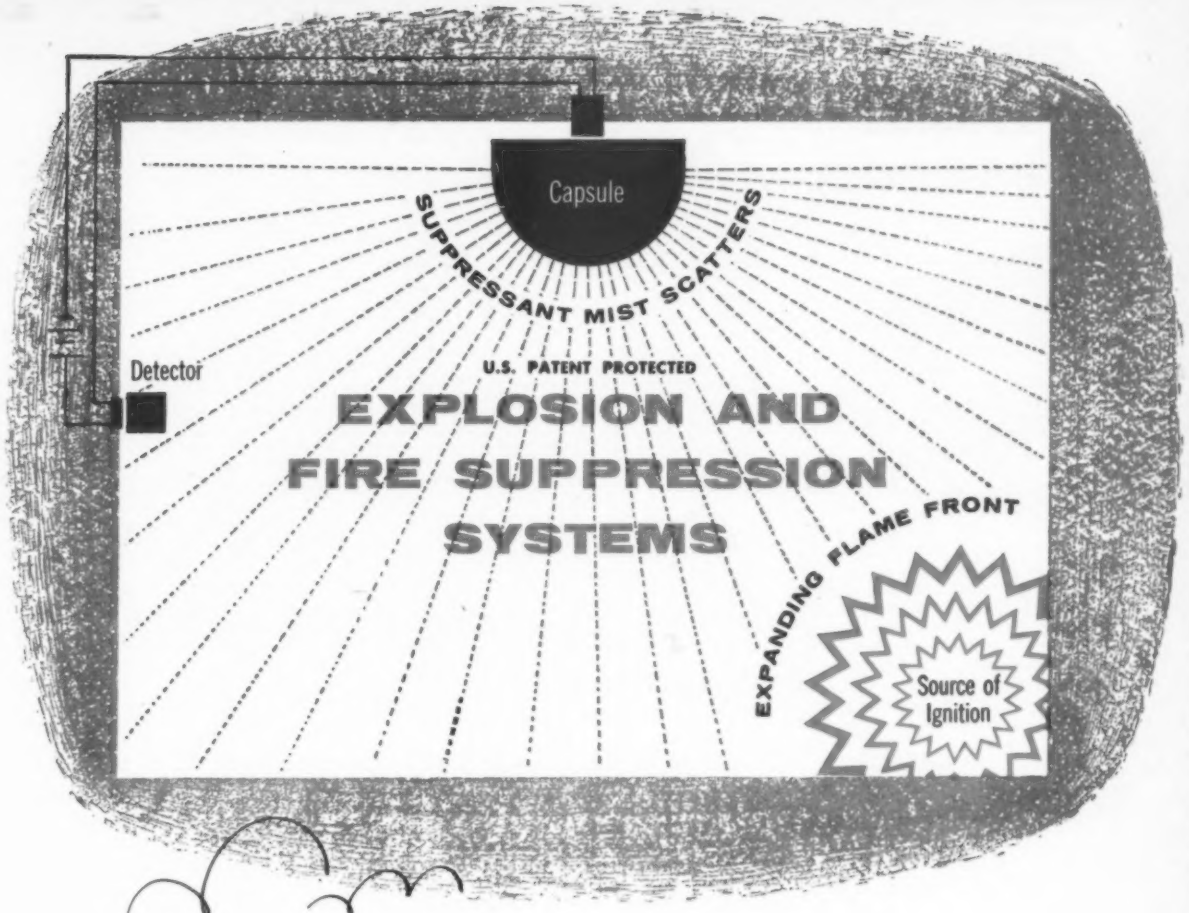

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Rotation: mechanical: continuous.
electrical: 350° max. (360° continuous precious metal wiping surface).
Torque: starting: .05 in. oz. for 1 gang; .03 in. oz. for each additional.
running: .035 in. oz. for 1 gang; .02 in. oz. for each additional.
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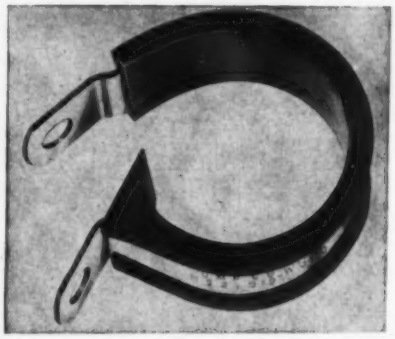
Wedge Clamps

New one-piece cushioned clamps announced by Universal Metal Products, Inc. feature a built-in wedge that enables full circle grip and positive pressure on the entire circumference of a line or conduit.



New design is available in all general purpose, fuel resistant, and high temperature rubbers. The bare clamps are of dural or steel construction.

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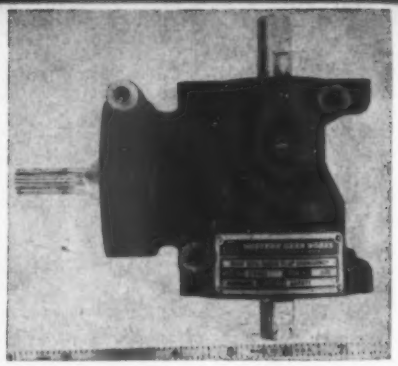

Angle Drives

The Model 1799E2 T-Box developed by Western Gear Works for emergency aircraft wing flap operation is one of a new series of T-Boxes and angle drives. It is rated at 1000 in./lbs. torque at 20 rpm and 400 in./lbs. at 40 rpm.

Maximum static torque is 1200 in./lbs. and ultimate static torque is 1800 in./lbs. It has been life-cycle tested up to 12 million revolutions, according to the manufacturer.

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IDENTIFICATION TAPE. New folder illustrates available colors and sizes of plastic "write-on" tape; Labelon Tape Co., Inc.

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WORM GEAR SETS. New standard worm gear sets now being marketed by Foote Bros. Gear and Machine Corp. are catalogued in new 24-page engineering manual SW-1.

Circle No. 89 on Reader Service Card.

GRINDING-POLISHING. A 60-page production digest on coated abrasive grinding and polishing techniques has been published by Behr-Manning Corp.

Circle No. 90 on Reader Service Card.

WINDSHIELD HEATING. New technical bulletin issued by Barber-Colman Co. Aircraft Controls Div. describes circuitry and operation of an automatic on-off control system for electrically heated windshield panels.

Circle No. 91 on Reader Service Card.

SPONGE RUBBER. Applications of ARco-CEL closed cell sponge rubber are illustrated in new brochure by Automotive Rubber Co., Inc.

Circle No. 92 on Reader Service Card.

AMPLIFIER. A new electro-mechanical amplifier for servo motor applications is described in 4-page booklet by Electomic Designs.

Circle No. 93 on Reader Service Card.

FILM LUBRICANT. Discussion of how colloidal dispersions have been used successfully for dry film lubrication is contained in Bulletin No. 438 issued by Acheson Colloids Co.

Circle No. 94 on Reader Service Card.

TRANSISTOR BASES. Electrical Industries has prepared a leaflet on its line of transistor and diode bases and closures.

Circle No. 95 on Reader Service Card.

PRECISION FINISHING. Forty cost-reducing operations using Liquamatte wet blasting are illustrated in 18-page booklet by American Wheelabrator & Equipment Corp.

Circle No. 96 on Reader Service Card.

LIFT TRUCK OPERATION. "How to Operate a Lift Truck" is the title of a 24-page publication available from Hyster Co.

Circle No. 97 on Reader Service Card.

METAL FINISHING. The Carborundum Co. has published a booklet on "Abrasive Grain and Powders" for use in metal finishing.

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LIGHTPLANE CONTROL. New 12-page brochure published by Lear, Inc., LearCal Div. describes its Arcon lightplane automatic rudder control.

Circle No. 99 on Reader Service Card.

METAL PRODUCTS. Jettisonable fuel tanks, shipping containers and aircraft parts produced by Royal Jet, Inc. are illustrated in new 20-page booklet.

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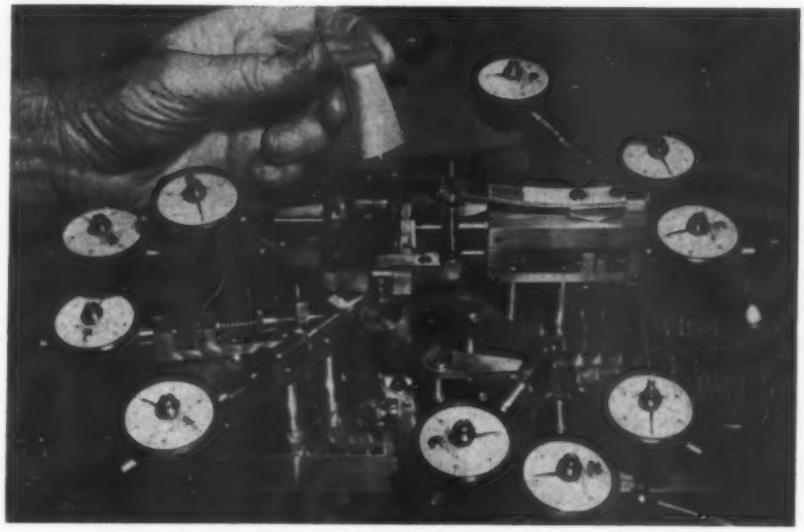
Maintenance Bulletin Board



BLADE of gas turbine engine is placed in position in Boeing's gauge.

New Gauge Uses 13 Sensitive Fingers To Measure Blade Tolerances

A versatile new gauging device developed by Boeing Airplane Co. is cutting costs, speeding production, and improving quality of turbine blades for its lightweight gas turbine engines. It is capable of measuring tolerances within .0005" and will do the same job in five minutes that previously took eight hours.

The new gauge is made up of a series of 13 fingers which protrude like small pistons from the open end of a cylinder. A spring maintains a light pressure to hold each finger out, but when one contacts a solid object it is forced in and applies pressure against the spring. A mechanical linkage attached to the opposite end of the finger connects it to a dial indicator.

In operation, a perfect master turbine blade is first placed in the gauge. Then, by movement of a master level, the inspector brings all 13 fingers against the blade at selected measuring points causing each finger to be pushed back slightly into its cylinder.

This moves the linkage which in turn actuates the needle of the dial indicator. All indicator needles are then set at zero and the gauge is prepared for use with production blades. It will then show any variation in dimension from the master at any one of the 13 critical points of inspection.

AA Uses Common Solvent To Remove Blower Deposits

American Airlines has developed a simple procedure for removing engine blower section gum deposits using orthodichlorobenzene—a common solvent. Now in use on AA's Pratt & Whitney R-2000 and R-2800 engines, it restores up to two inches manifold pressure and eliminates the need for premature engine disassembly due to power losses caused by excessive blower deposits.

The solvent is introduced into the engine slowly through a connection on the carburetor adapter. With the engine operating at 1300 rpm, a ½" rubber hose is inserted into a can of ortho and from two to three gallons are introduced in about 30 minutes.

Effectiveness of this method is considered superior to that of force-feeding which has shown a tendency toward dilution of crankcase oil with the solvent. As a further precaution in the AA procedure, treated engines are not run above 1500 rpm at 30 inches manifold pressure until all spark plugs have been changed.

The material used by American for the clean-out operation is a technical grade of ortho with a maximum of 0.01% hydrochloric acid, produced by Monsanto Chemical Co.

Pinch Roll Method Cuts Cost In Propeller Blade Grinding

Hamilton Standard, division of United Aircraft Corp. has found a way to reduce costs and increase production by 50% in grinding operations during manufacture of hollow steel propeller blades. The H-S answer was introduction of automatic reciprocating pinch roll equipment in place of a through-feed method used in the past.

The shell or exterior of a hollow steel blade is produced from a flat, cold-rolled steel sheet that measures 110" long and 54" wide and, because blade balance is critical, all sheets must be of a specified thickness. Since stock received from the steel mill will vary as much as .006" in thickness, it is necessary to remove excess material with a wide-belt grinding machine.

The average sheet, Hamilton Standard found, weighs about 65½ lbs. and requires removal of .002" stock. A 60-grit belt coated with aluminum oxide abrasive is used for the roughing operation and calls for 20 passes. Past practice with the through-feed method involved insertion of a sheet at one end, taking it out the other, then moving around the machine to the starting point—repeating the process 20 times.

By installing a photocell over the machine's weight-checking table and a microflex counter on the machine, the operation becomes virtually automatic. First the counter is set for the required number of passes and the photocell reverses the pinch rolls after each pass. Once the counter has completed its preset cycle the sheet is automatically ejected onto an inspection table.

Use of the reciprocating pinch roll method results in grinding both with and against the direction of travel of the abrasive belt. This increases the amount of stock removed per pass by almost 50% over the through-feed approach in which all grinding is done with the grain of the belt.

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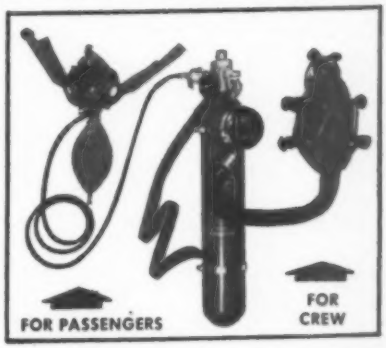

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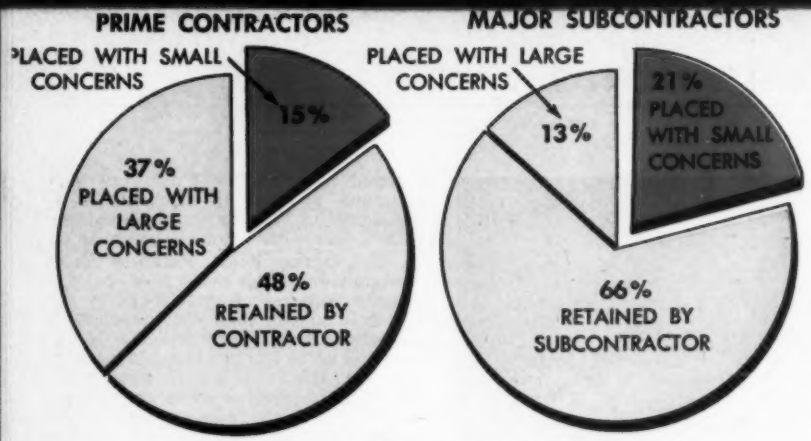

DISTRIBUTION OF DOLLARS BY AF CONTRACTORS

Small Business Is Getting A Bigger Slice of the AF's Pie

SMALL BUSINESS is getting a larger share of Air Force contracts.

Most recent AF report on the subject shows that firms employing less than 500 persons during fiscal 1954 obtained 76%, dollarwise, of work they were capable of producing or performing.

Amount of AF money they received totaled $556,715,000, awarded through 648,312 prime contracts and purchase orders transacted directly between the AF and the supplier. AF experts figured that small business would have been capable of performing work amounting to $733,086,000 in fiscal 1954.

• **The 76% figure** last year compares to 73% during fiscal '53 and only 55% in fiscal '52.

AF small business authorities express optimism about the increasing importance of small business in AF procurement. Charged with responsibility for this program in the Pentagon is Brig. Gen. Thomas P. Gerrity, who heads the Directorate of Procurement and Production under the Deputy Chief of Staff/Materiel. Said Gen. Gerrity:

"The increasingly successful participation of small business in contracts for the type of items they are capable of producing is impressive—and most gratifying. The program itself is positive, rather than negative, in that its constant aim is to provide more and truly equitable opportunities for small concerns to contribute their skills and resourcefulness. And it, of course, works to the benefit of the Air Force as well as to the small business community."

• **Since about 90%** of the AF budget for procurement of air weapons and equipment goes to large industrial manufacturers in prime contracts, the AF is making a continuous effort to insure that a fair proportion of this amount goes to small business in subcontracts.

Best indication today of how prime contractors are distributing the AF dollar in subcontracts comes from the following figures worked up from a cross section of reports from primes *(see chart)*:

Air Force Advisory Group On Small Business

• **Stanley E. Bostwick,** vice president, Edo Corp.; **T. C. Coyne,** vice president, Curtiss-Wright; **F. L. Dobbins,** materiel manager, Boeing (Seattle); **Paul Donham,** professor, Harvard Graduate School of Business Administration; **Otto Dworak,** chief of outside production, Convair (Ft. Worth); **E. K. Foster,** vice president, Bendix Radio; **George Fouch,** general manager, Jet Engine Div., General-Electric; **Frank J. Giorrianni,** director of general supply, Allison.

• Also **Ernest F. Leathem,** assistant to president, Raytheon; **Glen McDaniel,** president, Radio-Electronics, Television Manufacturers Association; **Rulon Nageley,** director of materiel, North American Aviation; **Ralph J. Osborn,** director of materiel, Lockheed (Marietta); **Mundy I. Peale,** president, Republic Aviation; **A. D. Plamondon, Jr.,** president, Plamondon Magnetics Co.; **Louis Ruthenburg,** chairman of the board, Servel, Inc.; and **Howard D. Williams,** president, Washington Mills Abrasive Co.

Prime contractors are retaining 48% of each AF dollar to carry on work in their own facilities. They are placing 37% of it with large business in subcontract work. The remaining 15% is going to small business in subcontracts placed by the prime contractor.

What are major subcontractors doing with their money? Approximately 21% of the dollars they are receiving is being passed on to small business concerns by them.

To develop a healthy subcontract program for small business, the AF has obtained the assistance and cooperation of its large contractors. Working toward this goal is the Air Force Advisory Group on Small Business, consisting of 16 AF prime contractors who meet quarterly in the Pentagon (see box).

In its last meeting Jan. 28, the group worked on an improved system of reporting subcontracts with small business and discussed general purchasing department procedures in negotiating contracts with small concerns, according to Kennard Weddell, AF Assistant for Small Business.

Regarding prime contracts to small business, AF authorities point out that "there has been no diminution in the AF prime contract base of small concerns since the cessation of hostilities in Korea." They present these facts and figures to prove the point:

• **At the end** of fiscal 1954, there were 2221 small business concerns operating as AF prime contractors. This was 68% of the total number of prime contractors, and the face value of prime contracts held by them amounted to $851,254,000, an average of $383,000 for each plant.

This was an increase over comparable figures reported a year earlier, when there were 2209 small and 974 large prime contractors doing work for the AF. • • •

Economy, Shorter Take-offs Predicted for DC-8

Douglas Aircraft Co.'s DC-8 entry for the future jet transport market will have operating costs significantly lower than such current models as the DC-6B, DC-7, and Constellation, according to Douglas aerodynamicist R. S. Shevell. The DC-8's economy, he says, will be gained by improved jet engine efficiency combined with the higher seat-mile-per-hour productivity that comes with high speed.

Shevell further predicts availability of improved take-off thrust of jet engines by the time commercial jet service starts, and that airfoil developments will permit lower take-off speeds with high Mach number wings. The two, he said, will combine to give take-off lengths as good as or better than those of the DC-7 for any domestic route.

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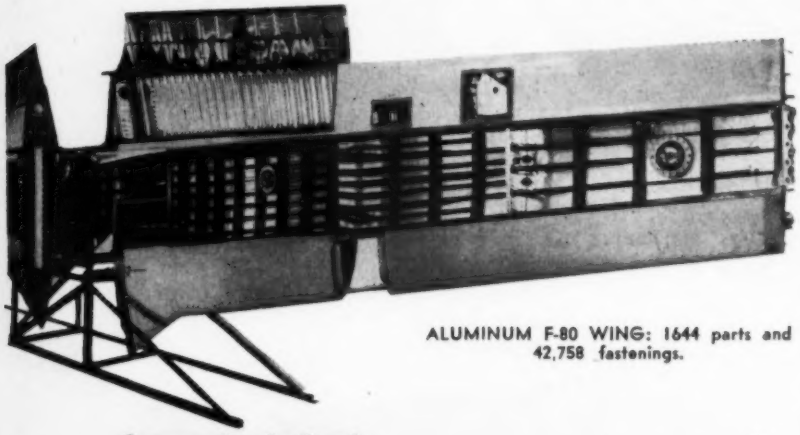
Many Scientific Advances, But Noise Still Baffles

SCIENCE has accomplished many wonderful things in aviation and more are on the horizon. Immediately apparent are solid rockets in which thrust levels can be programed to suit the user, magnesium airframes to improve performance and cut costs, improved helicopter performance, greater transport safety, and a host of other aerodynamic and thermodynamic advances.

But it looks like aircraft noise will be with us in ever-increasing volume. This was one important conclusion drawn from the 23rd annual meeting of The Institute of the Aeronautical Sciences in New York late last month. Unlike other sessions involved in the program of 75 technical papers, the "Aircraft Noise" session was marked by the attitude that "the more we know about noise the less likelihood we see of reaching any real solution."

This doesn't mean there's any shortage of effort. A few years ago engineers simply didn't know the source of aircraft and engine noise. Today it's generally agreed that a large share of the noise comes from the turbulent mixing of air as it is compressed, burned, and exhausted from the jet engines. Efforts to reduce noise level generally involve reduction in turbulent flow, but this carries performance penalties disproportionate to the improvement.

F-80C: A complete magnesium aircraft.



ALUMINUM F-80 WING: 1644 parts and 42,758 fastenings.

MAGNESIUM WING: 508 parts and 16,050 fastenings—savings of more than 60%.

• **The by-pass engine** is one design approach to reducing air velocity through the engine and consequent turbulent air mixing. The degree of noise reduction is directly related to the ratio of by-pass air to combustion air, and any major gain would require an engine specifically designed for low noise levels. Even so, the by-pass engine is a narrow speed-band engine and would not find universal applications, particularly not at speeds above 600 mph.

Said the NACA team (Edmund E. Callaghan, Newell D. Sanders, and Warren J. North) in speaking of noise reduction devices: "A large number of noise reduction devices have been investigated, but as yet no gadget or piece of hardware exists that can be mounted on the engine to decrease noise in flight. For ground engine runup, screens placed transversely across the jet show considerable promise. For high jet pressure ratios the convergent-divergent nozzle is considerably quieter than a convergent nozzle.

"A possible solution to the noise problem is a reduction of jet velocity. At least for the case of the jet transport the by-pass engine gives considerable noise reduction and it appears that performance of the airplane might actually be improved."

• **On the material front,** the IAS speakers had more to promise. An all magnesium F-80C *(see photo)* is expected to make its first flight sometime

this month, according to J. P. Donald Garges. Garges, an engineer with East Coast Aeronautics, told IAS that an undisclosed number of Grumman F9F's are now flying in carrier service with magnesium wings. The first of two magnesium F-80's was delivered to Wright Air Development Center almost a year ago for static tests and the carrier tests have been under way with the F9F's since January 1954.

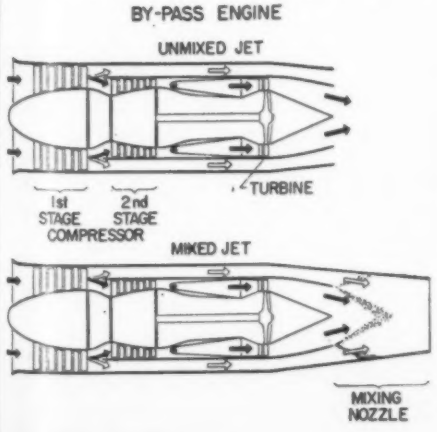
Particularly interesting were Garges' figures on relative simplicity of magnesium wings compared to conventional sheet aluminum structures. In the case of the F-80C wing, magnesium structure reduced the number of wing parts by 69%—from 1644 to 508—and reduced the number of fasteners by 62% —from 42,758 to 16,050. With the F9F outer wing panel East Coast Aeronautics was able to cut the number of parts by 41% and the number of fasteners by 42%.

Flight experience with the F-80C with magnesium wings showed a 5 mph advantage for the redesigned wing, and the greater structural rigidity provided higher rates of roll.

Since magnesium has little heat tolerance, its future is still tied to advances in magnesium alloys and to the applications of titanium and other metals. While still important, the gains are somewhat less attractive when measured against integrally stiffened aluminum alloy applications.

• **On the operations front,** IAS members were told that American Airlines will realize net savings of $61,200 per aircraft per year through the use of Sperry A-12 Gyropilots on its Douglas DC-7's. This figure, according to American's M. G. Beard and Sperry's Percy Halpert, is the net savings on gross savings of $250,000 per aircraft per year, minus the $188,800 amortization and maintenance costs.

TWO VERSIONS of the by-pass engine. Mixed jet is quieter due to lower temperatures and velocity of gases in mixing nozzle.



Beard said that AA saves 6.2 minutes per trans-continental non-stop flight with its DC-7's by use of the autopilot. Since American's DC-7's started operations without autopilots, and they were later added, the transcontinental operation was an ideal proving ground for comparative results. Twenty-nine pairs of flights were selected, with each pair flown under the same meteorological conditions, over the same routes, at the same altitudes, and at maximum cruise power.

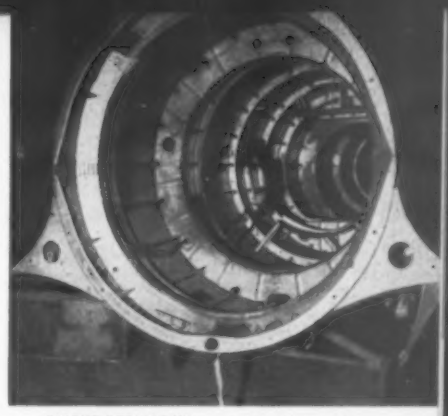
• **Expanded weather reports** that tell the pilot what he most needs to know may soon be tried at Newark Airport. In a double-barrelled report on bad-weather approach problems, the IAS heard the Weather Bureau's R. C. Wanta and Sperry's R. P. Snodgrass outline the results of a year of tests conducted at MacArthur Field, Long Island, under sponsorship of the Air Navigation Development Board. The results may soon be put to the test of commercial operations *(see page 62)*.

From 1950 through 1952 Sperry had been testing flight instruments by means of low-ceiling landings. In 1952 ANDB gave it a contract to help evaluate two new instruments developed by the Weather Bureau—the rotating ceilometer for measuring cloud height and the transmissometer for measuring visibility in a horizontal plane. The flight tests began in January 1952, and ended in February 1953, during which period a standard Weather Bureau station was set up at the airport. A total of 468 instrument approaches were made, with emphasis on conditions of less-than-500-foot ceiling and one-mile visibility.

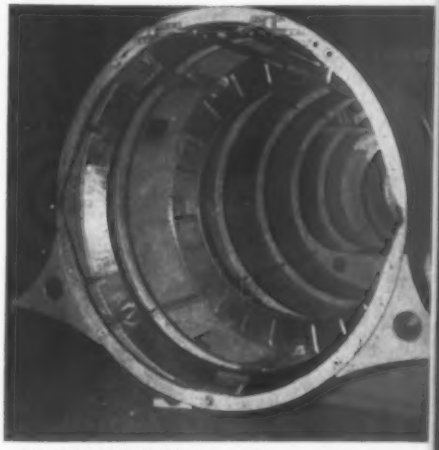
From the mass of data accumulated there emerged some information about the problem of bad-weather landings and some clues to a partial solution.

Sperry found probabilities the most significant means of handling its data. For one condition where the ceilometer indicated cloud height of 400 feet, the probability of the pilot sighting the ground by the time he had reached 450 feet was approximately 0.3. By the time he was down to 400 feet the chances were almost nine in 10 that we would have made visual contact with the ground.

The Weather Bureau found that its new instruments could predict cloud height and visibility "reasonably well." The ceilometer, with a nominal accuracy of one degree, on one test proved to have an accuracy of less than one-half degree. "The outstanding result," declared Wanta, "is that the pilot obtained first vertical contact on the average about 100 feet above" the ceiling reported by the standard Weather Bureau station. This was the case in 92% of the daytime landings, and in 86% of those at night.



SHEET-STRINGER construction of standard aluminum F-80 aft section.



BY COMPARISON, magnesium structure has only four attach-longerons.

What is needed, concluded Sperry, is a weather report which will tell the pilot at what altitude he will see the ground, the approach lights, and the runway threshold, and what the visual range along the runway will be. Tests of the usefulness of such expanded reports may start this fall at Newark, financed by the ANDB. Airline pilots will be given the reports, and their comments will be used to check the system.

• **The increased safety** that may result from such tests should be accompanied by an insistence on increased safety in the airplane itself, William Stieglitz of Republic Aviation Corp. told the meeting. "Just as we require that every new aircraft model be faster, or more economical, or have greater range than the best existing aircraft of the type, so must we require that it be safer," he declared. The time has come to stop the practice of adding safety features only if they don't impose too much of a penalty on performance, cost, or other parameters.

Both our interest in preserving human life and our interest in making

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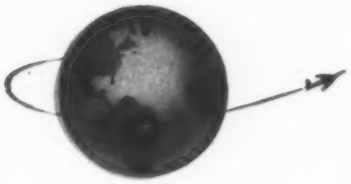

thank you, **gentlemen!**

Confident in the influence of AMERICAN AVIATION's readers, and confident in the editorial scope and quality those readers find in its pages, these advertising agencies served their clients' interests by placing 1108 pages of display advertising in AMERICAN AVIATION during 1954, continuing a record of consistent yearly increases since 1948.

American Aviation

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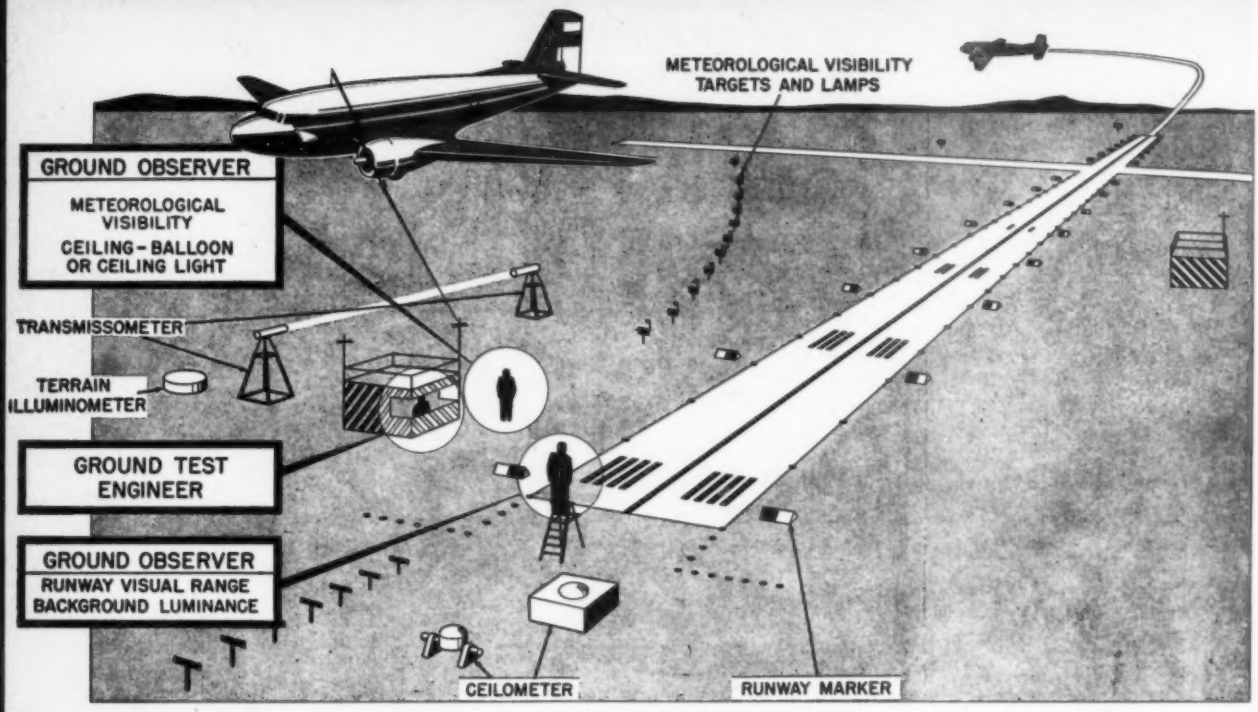

ARTIST'S IMPRESSION OF EQUIPMENT SET-UP AT MacARTHUR FIELD FOR STUDY OF BAD-WEATHER LANDINGS

money dictate a changed attitude, said Stieglitz. With forthcoming transports costing between $4—$5 million, the cost of a single accident becomes so great that we cannot afford to do without safety devices, even if they cut into payload or performance. Such performance losses are paper losses, he said, since "the estimated time of arrival on a pilot's flight plan is meaningless if the airplane crashes en route . . . Safety and reliability are part of the overall performance of an airplane. Without them, the term actually defines only potential performance: how an airplane could perform—if it were reliable, if it were safe."

Before design decisions can be made on a rational basis, allowing for safety and reliability, said Stieglitz, we must discover how components of aircraft equipment have performed and are performing. Since the reliability of the entire airplane is the product of the reliability of its systems which are in series with each other, it is vital that the designer possess accurate knowledge of the reliability of each component. Such a large-scale study, including all malfunctions which *might* have been the cause of accidents as well as those that actually were, would enable the industry to adopt a statistical approach to the analysis of equipment failures.

Stieglitz suggested coining the word "performability" to represent the interrelatedness of safety, performance, and reliability.

• • •

LIKE AN OLD-TIME COWCATCHER, a net suspended from the cabin of a British Royal Navy helicopter scoops up and raises survivors from the sea. The new rescue device will be used to rescue injured or unconscious men who might be further injured by the usual methods of fastening a strap or sling around their waists.

Airwork Steps Up Schedule With Leased DC-6A's

Airwork Ltd. will inaugurate twice-weekly scheduled transatlantic cargo service between Europe, Montreal, and New York on March 2. The British independent has contracted with Slick Airways for the latter to supply it with DC-6A aircraft and crews pending receipt of its own three DC-6A's which are on order for 1956 delivery.

Airwork has the option to provide its own crews on 30 days notice to Slick.

—OUR COVERS—

As our readers noted with the issue of Jan. 31, AMERICAN AVIATION now carries advertising on its front cover. This is in keeping with a growing trend among aviation publications, and we're happy to announce that all of our covers have been contracted for in 1955 on an alternate issue basis by Minneapolis-Honeywell Regulator Co. and Convair, a division of General Dynamics Corp.

SIMPLE...VERSATILE...LIGHT...MOST PRACTICAL ANTENNA TUNER YET!

THE AER-O-COM MODEL AAT TYPE 4 AUTOMATIC ANTENNA TUNER

The new Aer-O-Com automatic antenna tuner is the complete answer to antenna tuning for all commercial aircraft, for it tunes all fixed wire antennae, grounded or open, on all aircraft from DC-3's to B-377's!

It's the lightest on the market—just 16½ pounds. It tunes rapidly and effectively. It's simplicity means lowest cost and easy maintenance.

Aer-O-Com's Model AAT, Type 4 Automatic Antenna Tuner . . .

FITS YOUR NEEDS BECAUSE . . .

Meets essential requirements of ARINC Characteristic #525.

Operates efficiently into all fixed wire antennae, grounded or open, over the frequency range 2-22 mcs, for all sizes of aircraft ranging from DC-3 and CV-340 to DC-7, L-1049 and B-377.

Simplicity, dependability, light weight. Rotating circuit parts consist of one standard type variometer, one standard type variable air capacitor, and one element selecting switch. Uses only one vacuum tube, 2D21 (5727). Dependability assured by simplicity of parts and design.

Average 5 seconds tuning time for typical international frequency plan (2-22 mcs) on DC-6B. Maximum tuning time 15 seconds.

Requires no frequency information from transmitter or selector switch, therefore can be used with any type of H.F. transmitter having a 52 ohm coaxial output, a nominal carrier power of 50 or 100 watts, and providing necessary control for the tuner.

Requires only 27.5 VDC primary power (1A standby and transmitting, 3A tuning); 50 MA at 400 VDC for only 1 second during tuning cycle.

External RF relays not required, even for dual installation. Tuner is fitted with two front panel mounted RF relays for optional use. One relay operates with P-T circuit and may be used to transfer antenna directly to receiver input circuit; the second relay is used in a dual installation, to ground the antenna when the other transmitter is being used.

AER-O-COM EQUIPMENT for your complete communications needs!

Here are the companion pieces to the Model AAT, Type 4 Automatic Tuner: all of which operates on 27.5 VDC (no 400 cycle power required)

Model AT-144 Airborne Transmitter: Frequency range 1.6 - 1.75 and 2.0 - 22.0 mcs covering 144 independent crystal controlled frequencies. Weight 44 lbs. Separate transmitter and receiver permit cross-band operation.

Model AR-144 Airborne Receiver: Has a frequency range of 2.1 - 18.5 mcs. covering 144 crystal controlled frequencies. Weighs 33.2 lbs.

Model DPU Power Unit: Proven dynamotor type, 33 lbs.

AER-O-COM

A-110

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For Agriculture

WHY NOT HELICOPTERS?

By LOIS C. PHILMUS

CERTAIN CHARACTERISTICS of helicopters make them particularly adaptable to agriculture, but, because helicopter manufacturers have had to concentrate on military production, the commercial operator has had "to pioneer much on his own to develop an agricultural potential and to modify the equipment to suit his needs."

This is the opinion of Dr. Carrol M. Voss, entomologist and pilot for New England Helicopter Service, expressed at the Agricultural Research Conference held in Chicago recently.

Many features designed into new agricultural airplanes are already available in the helicopter, according to Voss. "Slow flight performance with full maneuverability are characteristics of both," he said. "And the downward airflow through the rotor aids in controlling and more thoroughly spreading chemicals. Increased visibility afforded by helicopters makes possible greater accuracy in laying down chemical dusts . . . swath control is precise," he added.

Another advantage: Night operations can be carried on very easily with a helicopter, thus taking advantage of optimum weather conditions.

Voss said the relatively low payload of a helicopter is not a serious disadvantage compared to the agricultural airplane. Present-day small helicopters made by Bell and Hiller and used in agriculture will carry 500 lbs. of dust or 65 gallons of liquid spray, while the Sikorsky S-55 is available with a hopper that holds 1600 lbs. of dust or 200 gallons of spray.

With the helicopter, loading sites are less of a problem than with an airplane. "With an efficient loading set-up a helicopter can be reloaded and in the air in less than one minute after landing," according to Voss.

What can be done to improve helicopters for agricultural use? Voss listed the following:

• **Standardized equipment** with one or two standard hopper arrangements designed to fit any helicopter with interchangeable gate mechanisms at the bottom to fit a variety of uses.

• **Standardized cockpit controls** to operate the gate mechanisms. "Current design with the electrical actuator buttons on the cyclic stick is good," Voss feels, and "a manual gate lever mounted next to the pitch stick has been successfully used . . . It does however pose a flight hazard when operating in tight situations."

• **Computer** to assist the pilot in dosage problems.

• **Incorporate crash protection** device as bar or tube around the front bubble from bottom to top. "This could also be rigged as a wire-cutting device," Voss points out. "The rotor mast itself serves as a good turnover protective structure."

• **Improved gate mechanism** design for dusting with positive shut-off and no dribble, to be adjusted from the cockpit. "There should be either an interchangeable gate or one which can be set to put out a wide range of weights from small poundage, as in some seeding jobs, to a very heavy poundage, as fertilizing," the entomologist suggested.

• **Improved air blast** supply to help break up the dust and deliver it more uniformly.

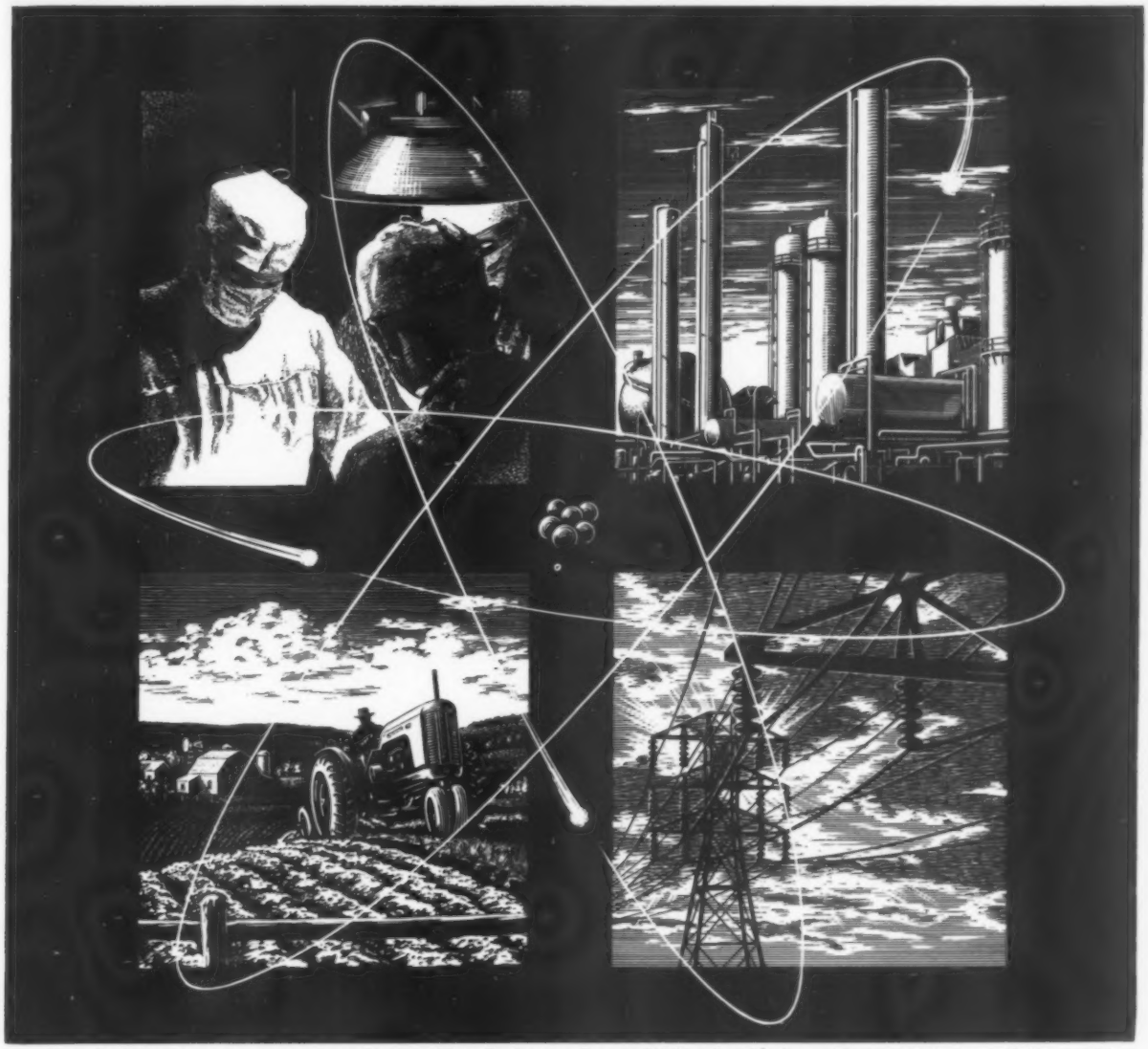
• **Spray pump** to develop higher pressure and output is needed for higher gallonage or greater atomization. "The hydraulic drive for spray pump and spray and dust gate mechanism as is currently available on the Hiller helicopter," Voss said, "may have advantages over the other types."

• **Testing of nozzle** configuration, sizes, and types for best deposit considering the slower speed of the helicopter.

"Much needs to be known," he added, "about the air flow effects through a rotor system on drift and deposit." He cited the approach by

CITRUS GROVE: Dusting by Bell 47-D

EGYPTIAN SUDAN: Hiller helicopters have sprayed vast acreages.



Engineers: North American offers unusual opportunities. Write Engineering Personnel Office, Los Angeles or Downey, California; or Columbus, Ohio.

THE PEACEFUL ATOM...IT'S WORKING FOR YOU!

North American Aviation early saw the need for development and application of the atom to peaceful purposes. Using its own funds, the company set up an organization staffed by leading atomic scientists and engineers. This Nuclear Engineering and Manufacturing organization conducts work for the Atomic Energy Commission and has initiated many new developments in nuclear applications.

This continuing effort has produced several types of research reactors. Two important examples of these, produced for the Atomic Energy Commission, are now in operation. One is being used by the company for advanced developmental study of other reactor designs, and general nuclear research is being done with the other. Other North American designed reactors for industrial and medical research will soon be in operation.

Still another example of North American's advance in this field is the "Sodium Reactor Experiment," a new reactor concept in atomic power. This development is being jointly financed by the Atomic Energy Commission and the company. From this will come many answers to the problem of producing economical electricity from the atom.

ENGINEERING AHEAD FOR A BETTER TOMORROW

NORTH AMERICAN AVIATION, INC.

Norman Akesson of the University of California in using balloons released from cages on the spray boom as "a good one."

Voss concluded: "Much research needs to be conducted since the airflow through a rotor offers a different effect and since the speed control from zero to 70 mph gives an additional factor . . . The small amount of past research needs to be compiled and a complete program of testing be laid out for rotary wing craft . . . There is a need for compiling data on agricultural procedures. With tested accessories and techniques the farmer would then not bear the brunt of experimentation as he so often does with new equipment or new commercial operations."

Speaking from the manufacturers' viewpoint, Charles Kaman, chairman of AIA's Helicopter Council and President of Kaman Aircraft Corporation, stated: "The monies being spent today by the military services to develop helicopters will directly benefit the commercial helicopter." He referred particularly to the initial cost of the equipment. "The military uses of the helicopter . . . are not so unlike agricultural dusting and spraying that the same basic design cannot be used for both," he continued. "It is safe to say that as the helicopter industry grows with the increasing needs of the military services, agricultural helicopters and general utility military helicopters of the same basic design and using identical parts can be produced side by side. This would indicate the volume of production needed to justify a corresponding reduction in costs."

CAA statistics show 77 helicopters in full or partial agricultural use today, operated by 26 helicopter companies, broken down by activity as follows: Dusting—19; spraying—28; seeding—5; fertilizing—2; defoliation—6; grasshopper baiting—1; pest control—5; agitating cherry trees—8; anti-frost agitation—2; knocking fruit from trees—2; chasing birds from rice fields—1; and checking crops—1. • • •

PEOPLE

Johnson to Leave ATA Presidency For General Dynamics Post

Earl D. Johnson, president of the Air Transport Association since February 1954, has resigned to accept the post of senior vice president—development and operations of General Dynamics Corp. Prior to joining ATA, Johnson was Assistant Secretary of the Army, and later Under Secretary. His successor to the $42,500 a year post has not yet been named, but Johnson will stay with ATA until transfer of control is effected.

JOHNSON

Jack Frye, president of General Aniline and Film Corp., will resign April 1 to return to aviation. Frye headed TWA from 1934 to 1947, but it was intimated that his new activity would not be an airline connection.

Manufacturing

General Dynamics Corp. has elected three new members to its board of directors: **Frank C. Nash,** former Assistant Secretary of Defense, who was also named to the corporation's executive committee; **Robert B. Watts,** v.p. and gen. counsel of the Convair Div.; and **Allen D. Marshall,** a v.p. and secretary of the corporation.

MERRILL

NASON

At Avien, Inc., Everett M. Patterson, formerly director of engineering, named v.p.-engineering and manufacturing; **H. Hawley Myers,** formerly secretary-treasurer, named v.p. and treasurer; and **William O. Boschen,** named v.p.-sales.

John A. Thompson elected secretary of Republic Aviation Corp. **Thomas Davis,** formerly secretary-treasurer, will devote full time to the treasurer's post.

Dr. J. A. Kyger, former chief scientist for the Nuclear Power Div., Bureau of Ships, named director of nuclear engineering for Avco Manufacturing Corp.'s Lycoming Div.

R. James Pfeiffer, formerly domestic sales mgr. for Convair, appointed director of commercial sales of the Fairchild Engine & Airplane Corp.

New vice presidents at Sperry Gyroscope Co., Div. of The Sperry Corp.: **Edward E. DaParma,** industrial relations, formerly director of industrial relations; **George A. Richroath,** works manager; and **Arthur R. Weckel,** sales, formerly gen. sales mgr.

In Sperry's Aeronautical Equipment Div.: **Frank Conace** named sales mgr.; **Spencer Kellogg** named engineering mgr.; **Michael Curatolo,** manufacturing supt.; **Thomas Hannah,** manufacturing planning supt.; and **Anthony Ruggiero** named quality control mgr.

J. L. Wheeler, aviation supvr., midwest territory for Shell Oil Co. in Chicago, retired Jan. 1 at mandatory age of 60.

E. F. Nason, former general sales manager of Elastic Stop Nut Corp. of America, joins Kaynar Co. as sales manager—Kaylock Div.

Admiral Luis de Florez elected to the board of The Pioneer Parachute Co.

Recent changes in Sperry Gyroscope Co.'s Federal Dept. include: **George R. Lawrence** to mgr., Air Force dept.; **Thomas W. Melia** to mgr., Army dept.; **Franklin H. Joseph** to policy and planning supervisor; **Gerald B. Wright** to ass't mgr. for research and development—Air Force dept.; **Vincent F. Acri** to ass't mgr. for production—Air Force dept.; **Robert C. Lyon** to ass't mgr., Navy dept.

Barry Willis, formerly v.p. of Grand Central Aircraft, appointed v.p.-operations, Pastushin Aviation Corp.

Raymond H. Matthews promoted from ass't to chief engineer of Fenwal, Inc.

Adm. J. J. Clark (USN Ret.), former commandant of the Seventh Fleet, named vice president of Radio Receptor Co. Inc.

Airlines

S. W. Merrill, cargo sales supt. for Pan American World Airways' Latin American Div., moves to Air Express International Corp. as gen. sales mgr. Feb. 1.

Thomas R. Nolan named director of and **Fred R. Erickson** named director of Northwest Airlines' air freight sales div. air mail and air express.

Robert A. Roe named Washington d.s.m. for National Airlines, replacing **Joseph C. Mulcahy,** transferred to Tampa.

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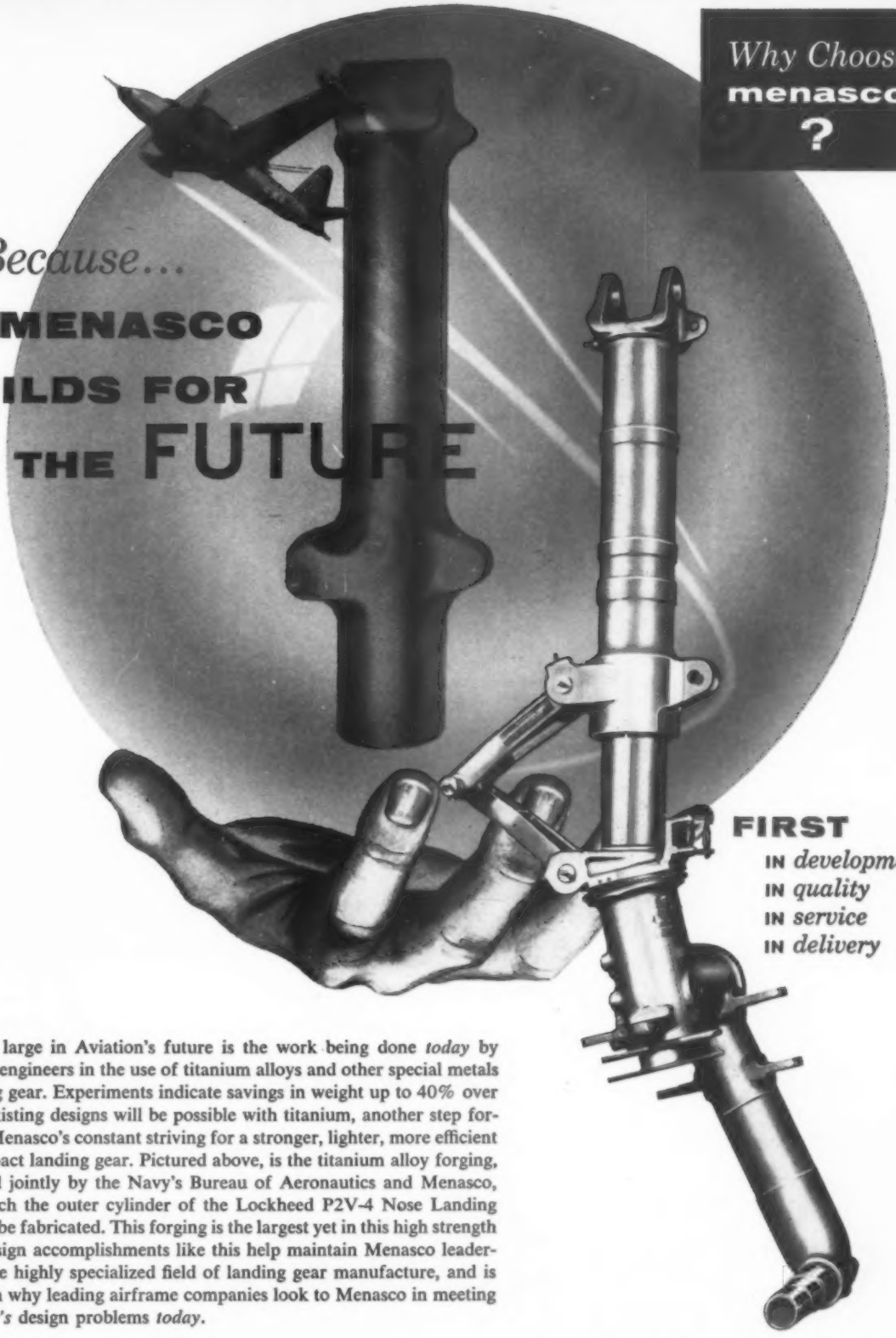

FIRST
IN *development*
IN *quality*
IN *service*
IN *delivery*

Looming large in Aviation's future is the work being done *today* by Menasco engineers in the use of titanium alloys and other special metals in landing gear. Experiments indicate savings in weight up to 40% over certain existing designs will be possible with titanium, another step forward in Menasco's constant striving for a stronger, lighter, more efficient and compact landing gear. Pictured above, is the titanium alloy forging, developed jointly by the Navy's Bureau of Aeronautics and Menasco, from which the outer cylinder of the Lockheed P2V-4 Nose Landing Gear will be fabricated. This forging is the largest yet in this high strength alloy. Design accomplishments like this help maintain Menasco leadership in the highly specialized field of landing gear manufacture, and is the reason why leading airframe companies look to Menasco in meeting *tomorrow's* design problems *today*.

Specialists in Aircraft Landing Gear

menasco manufacturing company

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AMERICAN ADDS A SECOND NONSTOP DC·7 BETWEEN WASHINGTON D.C. and LOS ANGELES

FASTEST AND ONLY NONSTOP DC·7 SERVICE BETWEEN THESE 2 KEY CITIES

2 NONSTOP Statesman FLIGHTS DAILY

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Ar. WASHINGTON	(EST)	7:35 PM	7:35 AM

PLUS 2 ONE-STOP FLIGHTS DAILY

*Effective March 1

America's Leading Airline **AMERICAN AIRLINES INC.**

TRANSPORT TRENDS

Washington, D. C., Feb. 14, 1955

LONG-STANDING CIVIL/MILITARY DISPUTE over choice of VOR/DME or TACAN as the future common system navigation aid came to a climax last week as the Air Navigation Development Board announced this course of action agreed to by Commerce and Defense: (1) finish TACAN development to make it suitable for common system use at the earliest practicable date: (2) continue VOR at least until 1965; (3) limit use of civil DME to experimental purposes with no guaranteed service beyond June 30, 1955; (4) permit military agencies to implement TACAN to meet their minimum interim requirements; and (5) as a back-up for TACAN (if it should later prove unacceptable) develop a CW omni-range facility in a higher frequency band.

Final Commerce agreement on TACAN came from Robert B. Murray, Jr., subsequent to his resignation as Commerce Undersecretary. Murray overruled CAA Administrator Lee and CAA representation on ANDB's special VORTAC Committee. Favoring TACAN in VORTAC were the Army, Navy, Air Force, and Air Transport Association. Opposed were CAA, Aircraft owners and Pilots Association, and National Business Aircraft Association.

NORTHWEST AIRLINES will not have to vacate its Seattle/Portland-Hawaii route as originally announced by President Eisenhower (see story, page 74). Under a wave of protest the President issued a revised decision reviewing NWA and Pan American for three years in the Seattle/Portland-Hawaii market.

COORDINATION BETWEEN THE AIRLINES and military services on air transport matters reached some type of peak early this month. Air Force Secretary Talbott called in the presidents or board chairmen of seven major airlines to get their opinions on future turboprop and turbojet transports.

Navy leased an R6D (commercial DC-6A) to Slick Airways for six months to test concept that military cargo aircraft can be maintained ready while put to productive use—without cost to the military services. It is the first rental of postwar aircraft to a commercial operator. Cost: $20,000 per month.

Formosan airlift was inaugurated with Air Force chartering planes of Seaboard & Western Airlines, Transocean Air Lines, and The Flying Tiger Line to carry Mutual Defense Assistance Program supplies.

Plans to lease two or three of the six turboprop testbed transports to the airlines were progressing, with Air Materiel Command putting finishing touches to the ground rules and preparing bid invitations.

DOMESTIC AIR TRAFFIC IS OFF TO A GOOD START in 1955. Reports from some carriers indicate that January was surprisingly strong. Some local service lines, for example, hauled more passengers last month than they did in December.

One industry researcher had forecast earlier that domestic passenger-miles might be up 7% to 11% this year. There's some feeling now that if general business conditions remain good, the increase may possibly hit 12% to 13%, which would mean about $100 million additional revenue for trunklines alone.

Happy landing! Braniff's Kansas City based contingent of hostesses arrives at Amon Carter Field for the two-day pow-wow at Ft. Worth's Western Hills Hotel.

American Aviation's Eric Bramley gets helicopter-shuttled from Amon Carter Field to the hotel heliport for the meeting. He enjoyed a 'copter meal en route.

Braniff hostesses get a pause that's a refresher

The Texas sun extends a warm welcome to (l to r) Teresa More, in charge of Latin American cabin service, Assistant Chief Hostess Pat Partin and Chief Hostess Dorothy Brindley.

Bob Bowling of the Neiman-Marcus Antoine Salon demonstrates (with Hostess Marian King) an easy-to-keep new hair do—just one of his face-saving tips.

A pleasant respite from flying and a valuable refresher in selling were recent orders of the day when Braniff hosted its hostesses at Fort Worth's famed resort hotel, The Western Hills. To this annual sales clinic (in country club atmosphere), the girls flew in from Kansas City, Dallas and Lima, Peru. They swam in the free-form pool, basked in the sun, lunched on the terrace — and got some top flight pointers from Braniff executives and Guest Speaker Eric Bramley, executive editor of American Aviation.

The important role hostesses play in Braniff's public relations and sale service program were topics in the meetings. But appearance and manner were stressed, too. And, to show Braniff's keen interest in these subjects, a representative from the John Robert Powers modeling organization was on hand — as was a member of the Neiman-Marcus Antoine Salon — for demonstrations in good grooming. Such friendly get-togethers as this have contributed much to Braniff's esprit de corps and resulting reputation for the finest, friendliest service on two continents!

BRANIFF *International* **AIRWAYS**

LOVE FIELD • DALLAS, TEXAS

Transport Aviation

Unsolved Airline Sales Problem

HOW TO SPEED UP PHONE SERVICE

By ERIC BRAMLEY

A COMPLAINING CUSTOMER recently wrote an airline: "I have just spent one-half hour waiting on the telephone for someone to take a reservation."

And a despairing passenger finally gave up and sent an airline the following wire: "Would appreciate you calling me at Glencourt 47230. Have been unable to reach you by phone concerning reservations."

These examples, although extreme, indicate that manning the reservations telephones is one airline sales problem that is far from solved. As one expert has put it: "The relation between the incoming telephone call volume, manning, and overall service to the customer is one of the widest fields of opportunity for study and development that we have in reservations activity. Much work has been done but much more remains."

An AMERICAN AVIATION survey of 12 trunk airlines shows that manning the phones is far from a hit-or-miss proposition. Several of the carriers are using formulas for manning.

However, even with formulas, it is unlikely that the telephone problem will be solved completely for some time to come.

It was apparent from the survey that the factors entering into a formula are extremely sensitive. An erroneous estimate of traffic, an unexpected increase in the length of incoming phone calls, an increase in the number of calls per passenger boarded, can throw things

HOW 12 TRUNKS ANSWERED THE AMERICAN AVIATION SURVEY

	How Reservations Phones are Manned	Average Length of Phone Calls	Calls Received Per Passenger Boarded	% of Calls Received Resulting in Sales
American	Formula is 7PU/5DC, explained in accompanying article. 70% of calls shall be answered in 20 secs.	150-200 secs.	Ranges from 4.1 in winter to 2.8 in good-weather months.	Not available
TWA	Uses formula. 90% of domestic calls shall be answered in 30 secs. if screened through a switchboard; 90% in 20 secs. if direct to an agent.	Each agent handles 12-15 domestic calls per hour.	About 2.7 domestic; 6.5 international.	Not available
United	Uses formula based on time studies of work elements. Survey showed 90% of calls involved no delay; 10% required less than 45 secs. handling time. A 20% "held call" ratio is maximum.	Agents expected to handle 12 calls per hour average.	Average of 2.	No record; however, 6% of incoming calls the cancellations, 5.5% reconfirmations.
Eastern	Uses formula; 80% of calls shall be answered in 20 secs. if through switchboard; 80% in 15 secs. if direct to agent.	Standard time is 2.5 min.	Not available	Not available
Capital	Uses manning tables based on agent production. Each phone agent credited with 21 passengers per day.	2.5 min.	2.5	Not available
National	No formula.	2:42.	2.5	46% reservations, 8.5% cancellations, 9% reconfirmation, 15.5% checking reservations, 21% flight information, misc.
Northwest	Formula based on number of passengers boarded per agent per day; 15 secs. answering time preferred; 20 secs. satisfactory.	3.5 min.	11.7 (average of 8 large stations)	29% reservations, 6.1% reconfirmation, 11.5% flight arrival, 6.9% departures, 13% flight information, 5.4% fare information, 10.3% wait list, 17.8% misc.
Western	No formula, no standard answering time, but "held" calls not to exceed 10% to 15%.	3 min.	4 (trunk, interoffice and intraoffice calls)	Estimate 25%-30% bookings, 25% cancellations, changes.
Delta-C&S	No formula; plans to use 120 calls per sales agent per day as one basis for manning.	Not available	Fraction less than 2 (4 largest offices)	Not available
Braniff	No formula.	Not available	Not available	Not available
Northeast	New York reservations office quota set by applying 450 passenger-per-month-per-agent figure against forecasted New York traffic. Boston quota is 500 passengers-per-agent-per-mo.	Agent handles 14 to 20 per hr.	2.6	Study 2 yrs. ago showed 35% sales, 7% wait list, 6% cancellations, 6% off-line sales, 8% reconfirmation, 27% information, 9% ticket office calls, 2% misc.
Continental	One agent for every 15-20 incoming calls; no standard answering time.	Estimated 2.5 to 3 min.	Not available	Not available

NOTE: Several carriers noted that figures given above are system averages, and that there will be variations between large and small stations. Seasonal variations can also be expected.

out of kilter and result in unanswered phones.

• **An excellent example** of a formula used for manning telephones is that of American Airlines: 7PU/5DC. Seven, in this instance, represents the number of days in the week the office is open, P is the estimated number of passengers to be carried in the month for which the manning is being calculated, U is the expected number of units (phone calls) per passenger, 5 is the number of days an agent can work, D is the number of days in the month the office is open, C is the capacity of an agent to handle units in one eight-hour shift.

The sensitivity of some of the elements of a formula are illustrated by the following example: if the average length of call is two minutes, and two more minutes is allowed for the handling of resulting paperwork, etc., an agent can handle 120 calls per shift. But if, unexpectedly, the length of call increases to three minutes (plus two for paperwork), the same agent would handle only 96 calls per shift.

Projected further—in a 31-day month, with the office open seven days a week, 10 shifts involving a total of 14 agents could handle 37,200 two-minute calls compared with only 29,760 three-minute calls.

• **In addition,** an Air Traffic Conference study made some time ago showed that a small error in estimating the number of calls to be received per passenger boarded can be disastrous. An error of only one-half of a call per passenger, at 15,000 passengers, would mean that an airline was not prepared to handle 7500 calls.

Officials answering the survey stated that the usual causes of poor answering are "an unexpectedly heavy peak . . . an unpredicted increased volume of business," Bad weather—or even what one reservations director described as "poor-appearing weather"— results in a heavy volume of inquiries for flight information, etc., and overloads the phones. Ironically, these are the times when good phone service is most needed, but there's no formula that can provide it.

When an unpredicted volume is encountered "immediate steps are taken to rectify it by using overtime, rescheduling, assigning traffic and sales representatives and other personnel to work as reservations sales agents," said a traffic manager. "In the meantime, steps are also taken to increase the personnel quota."

• **However,** he put his finger on the problem by adding: "By the time such increases are authorized, people hired and trained to meet the demand, the damage has already been done and complaints have been received."

It's possible for the carriers to staff their phones for *normal* heavy periods, but it is not economically sound to attempt to man for the unpredicted peaks.

Placed in a touchy position by the telephone manning problem is the local sales manager. Traffic estimates for manning purposes are made two or three months in advance. If a manager's estimate of passengers to be boarded at his station is too high, manning and service will be good, but the station will be uneconomically overstaffed. If the estimate is too low, service will be poor and business may go elsewhere.

Also, a manager may not know what a competitor is planning in the way of service, promotion, etc., two or three months ahead, and he may also be adversely affected by schedule changes and other factors in his own company. At best, estimating is a hazardous business, although one traffic expert stated that "all the airlines are getting better and better in their ability to forecast demand."

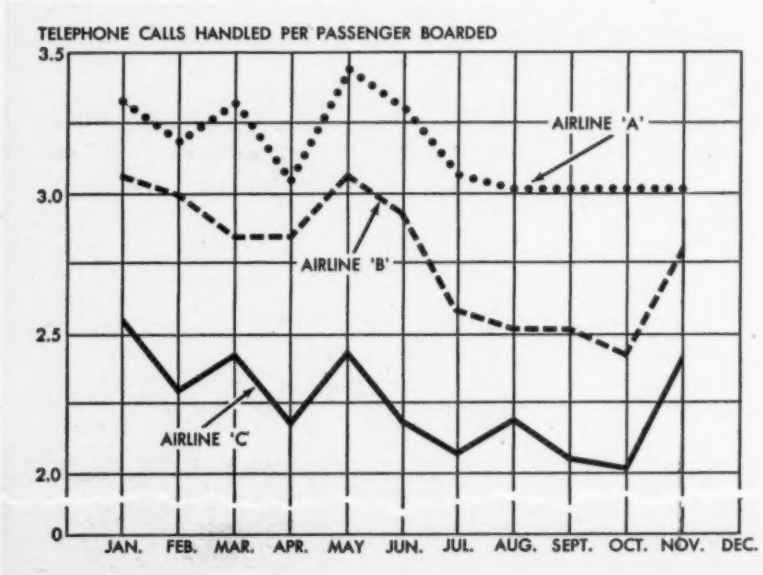
No carrier answering the survey said that its volume of complaints about phone service was heavy. Most stated that criticism was light—except in the unpredicted peaks. They felt that the standards set (American, for example, specifies that 70% of calls shall be answered in 21 seconds) are for the most part being attained *(for other standards, see table on page 71).*

The survey showed that the average length of phone call varies upwards from a low of about two minutes. The answers of the four carriers commenting on the "mix" of these calls indicated that anywhere from 25% to 46% result in reservations. Calls received per passenger boarded are in the 2 to 4 range, depending on weather and other factors. The two heaviest telephone days are usually Mondays and Fridays, with Saturdays and Sundays at the bottom of the list.

• **No one claims** to have all the answers to the manning problem. "It's an extremely difficult situation to resolve," said a reservations director. "On the one hand you have rising costs of telephone agents, physical limitations of offices, equipment, etc., and on the other hand you have the competitive need for good telephone service. We feel that satisfactory telephone service is one of our best means of securing passenger goodwill, and that we must continue to improve it, and attempt to reduce the expense in other areas."

An official of one of the largest airlines summed it up: "There is still a lot of research to be done in this field before definite answers can be given to some of the questions . . . With more practice, more research into the problem involved in handling a large telephone volume, we will see continued improvement." • • •

EXAMPLE OF CALLS HANDLED PER PASSENGER BOARDED FOR THREE CARRIERS



Britain Will Let BOAC Buy 10 DC-7C's, Report Says

The British government will probably let BOAC buy 10 DC-7C's rather than 19 as requested by the airline, according to latest indications from London. It has also been reported that an unidentified financing group will offer BOAC the capital to lease 10 Lockheed L-1449 turboprop-powered Super Constellations.

Lease of the Super Connies would involve about $4 million per season.

"I didn't know you had a branch office here!"

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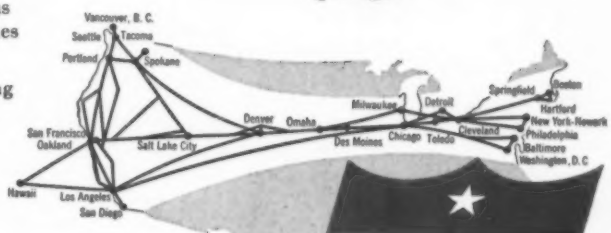
United Air Lines' speedy Mainliners make possible local service in cities hundreds of miles from your headquarters. Perhaps your business can reduce branch office overhead, expand into new territories or meet stepped-up competition, by using dependable, convenient United Mainliners as "branch offices with wings." And flying United Air Lines makes your salesmen's time more productive.

United Air Lines will arrange to have a rental car waiting at destination—giving full mobility for business calls, making the most of the time *saved* on United.



Typical DC-7 Mainliner® elapsed times:

Los Angeles-New York, 7¼ hrs. nonstop
San Francisco-Washington, D. C., 8¼ hrs.
New York-Chicago, 3 hrs. nonstop
Los Angeles-Chicago, 5½ hrs. nonstop

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For Mainliner reservations or information, call or write United Air Lines or an Authorized Travel Agent.

In the transpacific case

Eisenhower Says 'No!' to NWA Permanency

BY WILLIAM V. HENZEY

CAB RECOMMENDATIONS of permanency for Northwest Airlines to Tokyo and retention of NWA as the sole carrier between Seattle/Portland and Hawaii were reversed by President Eisenhower early this month. Instead, the President directed CAB to issue orders as follows:

- **Renew Northwest's** transpacific route to Tokyo for seven years;
- **Renew** NWA's certificate to Okinawa, Formosa, Hong Kong, and the Philippines for five years, and to Korea for three years.
- **Terminate** NWA's authority to operate between Seattle/Portland and Honolulu and renew Pan American World Airways' authorization for the same route for five years.
- **Renew** Pan Am's Honolulu-Tokyo segment for five years, its Hong Kong authorization for five years, and its Hong Kong-India routes for three years.
- **Defer action** on PAA's application to fly the North Pacific route.
- **Grant** United Air Lines permanency for its Los Angeles-Honolulu route, thus putting it on the same basis as UAL's San Francisco-Honolulu route.
- **Deny** new route bids of Trans World Airlines and Transocean Air Lines.

Involved are the so-called Transpacific Renewal Case and the West Coast-Hawaii Case. CAB's recommendations were forwarded to the White House in December. The States-Alaska Case, previously entangled with the Pacific cases, is still at CAB.

The President, in a Feb. 1 letter to CAB's acting chairman Chan Gurney, returned the board's findings and directed that new orders be prepared incorporating his decision.

- **In turning down** NWA's bid for a permanent route, the President said: "I do not approve at this time the permanent certification of Northwest Airlines, but desire that its certificate be renewed on a temporary basis for seven years.

"The continuation of two United States flag carriers across the Pacific at this time is required by considerations of national defense and foreign policy. However, I believe that permanent certification of Northwest Airlines is premature as long as subsidy payments are necessary for its operations."

On Pan Am's bid to compete with Northwest on the Great Circle route to the Orient, Eisenhower said: "I desire to hold in abeyance my decision . . . pending further study and later report on the economic and technical feasibility and the military and foreign policy implications of non-stop service between the West Coast and the Orient."

For the time being this means Pan Am will continue to operate the mid-pacific route through Hawaii to Tokyo, and NWA will continue to operate the Great Circle route. However, Pan Am is in a position to renew its bid for the Great Circle route.

The Seattle/Portland-Hawaii situation will, under the President's ruling, require Northwest to vacate Hawaii, which it has served only on the route from the Pacific northwest. Seven years ago, CAB found that no service was required between the points, but White House intervention resulted in both Northwest and Pan American getting temporary certificates.

During the course of the renewal proceeding, Northwest offered to operate the Hawaiian route as a stub-end of its domestic system without government subsidy.

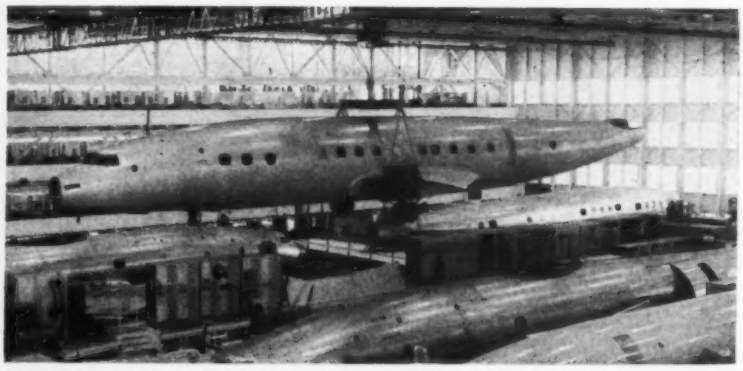
- **Eisenhower's decision** on this route was phrased this way: "I do not approve at this time the continued certification of Northwest Airlines on the Seattle/Portland-Hawaii route, but desire that the certificate of Pan American World Airways be renewed on a temporary basis. I believe that the choice of this carrier will contribute most to the sound development of our air transportation system in the Pacific."

Prior to submission of its December recommendations to the White House, CAB had for three months previous engaged in controversial debate over how the route structure in the Pacific should be set up.

During that debate, in which numerous tentative decisions were arrived at and then superseded, Commerce Secretary Weeks also became involved along with other Commerce officials.

Weeks reportedly was unsatisfied with the final CAB decision which went to the President and the action of President Eisenhower is said to be more in line with Weeks' philosophy than that expressed by other Commerce heads.

Since the CAB order reflecting Eisenhower's action was not completed at presstime there was no indication when Northwest would have to vacate its Hawaiian route. Usually a period of 60 to 90 days is designated.



LOOK, NO WINGS! Airborne for the first time is this 110-ft. fuselage section of a Super Constellation at Lockheed's new final assembly building at Burbank. Special load bar and sling suspended from an electrically operated overhead crane "airlifts" the 10-ton structure to a multi-unit assembly dock area. Wheels are temporary for rolling fuselage to final assembly hangar.

Locals Can Swap Travel For Advertising

More advertising by local service airlines is in prospect as a result of a decision by CAB. Each local service carrier will be permitted to exchange transportation for up to $25,000 of advertising on an experimental basis during the remainder of 1955.

Purpose of the new ruling is to let local service carriers increase advertising without creating a drain on operating capital.

PASSENGER COMFORT ASSURES REPEAT TRAFFIC

A "rickshaw romance"...on an AEROTHERM seat!

It all started aboard a trans-Pacific airliner. The Aerotherm Seat was so comfortable, so relaxing. When the plane landed, one seat was missing, and so was the Colonel. It was later found on his rickshaw! Now, to boost passenger comfort and repeat travel, every rickshaw boy wants an Aerotherm!

Aerotherm Seats give passengers a feeling of confidence and security. They actually help to relieve physical and mental tension . . . make the ride less tiresome. At flight's end, passengers debark with an enthusiastic swing in their stride . . . ready for business or pleasure.

Aerotherm Seats are engineered and manufactured to rigid specifications. They provide maximum passenger comfort . . . are light in weight . . . and are styled to enhance the plane's interior. Yet they assure highest structural safety factors. And their adaptability of design offers a variety of seating arrangements.

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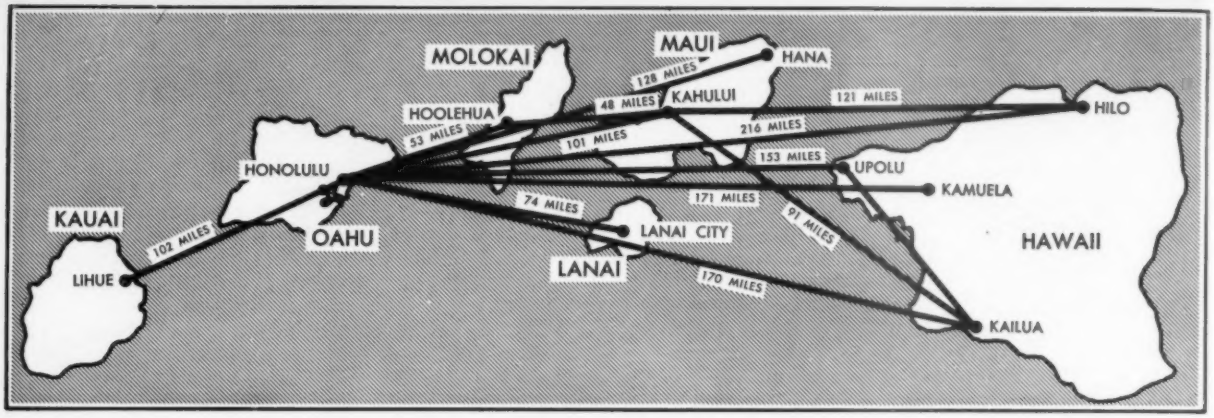

IN HAWAII the major islands depend solely on air transportation for their inter-island travel needs. Over a half million natives and tourists travel annually via Hawaiian Air Lines and Trans-Pacific Airlines between the islands.

HAWAII: Testing Grounds for Airline Policy

ONE OF THE MOST important testing grounds for future airline competition policy is Hawaii, where CAB soon will be called on for the third time to consider the bid of "newcomer" Trans-Pacific Airlines to compete with 25-year-old Hawaiian Air Lines, Ltd.

Up for renewal of its temporary operating rights, TPA last month passed a significant hurdle when CAB examiner F. Merritt Ruhlen recommended renewal of its certificate through 1959. A final decision by the board on Ruhlen's recommendation is the next hurdle.

TPA, once a non-scheduled airline, entered the picture in mid-1949 to compete with Hawaiian Air Lines, which had been operating scheduled services in the islands since late 1929. TPA's original certificate from CAB was for the carriage of passengers and cargo. Excluded was the right to carry mail and, with it, the right to federal subsidy assistance during the developmental years.

• **In May 1951,** however, CAB amended the certificate to include mail rights and from that date on the battle between TPA and HAL assumed the aspects of competitive war.

However, examiner Ruhlen indicated it has been a healthy war. The public has benefited, both airlines appear to have benefited, and, by the end of this decade, it should cost the government no more for the two airlines than it would to drop TPA and give sole rights to permanently certificated HAL.

In fact, the record in the renewal case shows that the half-million passengers carried by both TPA and HAL will grow steadily during the present decade, reaching a total of approximately 875,000 by 1959. Major increase is expected in the tourist field.

What makes the competitive picture so unique from a policy-making standpoint is that the Hawaiian Islands are wholly dependent on air transportation. There is no other means of transport available between the major islands.

According to examiner Ruhlen: "In considering Hawaii's air service needs, it is clear that nowhere within the jurisdiction of the board is there an area where certification of only one air carrier would place all transportation facilities so exclusively under the control of one organization."

• **In short,** it isn't a case of CAB giving one carrier exclusive air rights in the islands, but rather a case where the remaining carrier would have a monopoly of all transportation rights. In this regard, Ruhlen indicated CAB has a distinct duty to "insure that the air traveler obtains the most air transportation possible for his money." In effect, he credited the competition existent since 1949 with contributing to the fulfillment of that duty.

The subsidy requirements of both lines are extremely low in comparison to services in other areas of CAB's jurisdiction. For example, total mail pay for TPA—subsidy and service—is estimated at $95,000 annually in a current mail rate proceeding. Estimates for the future indicate total subsidy requirements of both carriers serving Hawaii will run less than $350,000 annually.

Significance of this low subsidy requirement is seen in the fact that the two carriers transport over a half million passengers while a typical U. S. local service line carried 118,000 passengers, yet required over $2.7 million mail pay.

To justify the outlay of subsidy for competition in Hawaii, Ruhlen phrased this argument: "If the board is justified in spending $25 million to provide local airline competition for surface transportation facilities in continental United States, some subsidy is justified to prevent a complete monopoly of all passenger transportation facilities between the Hawaiian Islands."

On experience to date with the TPA experiment, Ruhlen added: "Since inaugurating its certificated service TPA has provided Hawaiian with effective competition. Its participation in the inter-island traffic has increased from 22% with the inauguration of service to 30% at the present time.

"When it is considered that Hawaiian Airlines has been providing air service between the islands for 25 years and is operating modern postwar equipment in competition with TPA's DC-3's, this percentage of participation indicates not only effective competition by TPA but also a strong need for two carriers in the islands."

• **Although still** facing an uphill struggle to gain permanency in Hawaii, TPA thus is writing one of the better success stories in post World War II air transportation. The company is headed by Rudy Tongg and managed by executive v.p. David A. Benz.

Those close to the TPA operation are loud in their praise of Benz for the efficient management job which has made TPA an effective competitor. Just how efficient can be seen in Ruhlen's finding that TPA's "ratio of break-even need to commercial revenue is lower than that of any local service carrier it is approximately half of that experi-

The modern, attractive Hertz counter above, located at the Phoenix Ariz., Sky Harbor Airport, is Hertz' latest addition to its long list of airport rent a car offices. This new office, like other new Hertz airport offices springing up all over the country, is helping to bring you new passenger revenue. And here's how it's being done!

Hertz opens new office at the PHOENIX, ARIZ. Sky Harbor Airport

Hertz, already at most major airports everywhere, expands again to bring airlines NEW PASSENGER REVENUE.

Hertz originated the Plane-Auto Travel Plan. Because of it, many travelers no longer drive from city to city just to have their car at their destination. Instead, they fly in speed and comfort—rent a Hertz car on arrival. And they're assured of a clean, new Hertz car wherever they go because Hertz serves them at more airports and more cities than any other rent a car system. In fact, there are nearly 800 Hertz offices in over 550 cities throughout the United States and foreign countries.

To tell your passengers of the Plane-Auto Travel Plan, Hertz spends over $1,000,000 a year in advertisements in national magazines. No other company spends nearly as much to promote the plan. Neither can any other company offer your passengers 9,400 clean, new cars . . . and more than 30 years' experience in courteous rent a car service.

Hertz also assures you of steady Plane-Auto Travel Plan business because more than 1,500,000 qualified persons now hold Hertz Charge Cards and Courtesy Cards. Hertz also honors Air Travel Cards.

How you can help sell the Hertz Plane-Auto Travel Plan

Promote the Hertz Plane-Auto Travel Plan in all your advertising, displays, folders and any other advertising and promotional programs. And best of all: *urge your ticket sellers and reservation clerks to ask your passengers this simple question:* **"May I reserve a Hertz car for you at your destination?"**

For complete information about the plan, write:

HERTZ *Rent A Car* **SYSTEM**

Department C25, 218 S. Wabash Ave., Chicago 4, Ill. Phone: WEbster 9-5165.

enced by Piedmont, the next lowest carrier."

The company operates five Douglas DC-3's equipped with 28 seats each. When HAL in late 1952 began advertising its then-forthcoming Convair service, Benz spearheaded a door-to-door "Use it or Lose it" campaign to keep TPA in the picture.

After the initial impact of the Convair competition in 1953, the campaign bore fruit in early 1954 and TPA resumed its increasing participation in the market.

While Benz credits "Use it or Lose it" with turning the tide, the continued upward surge of TPA's traffic through 1954, he said, should be credited to TPA's employees who "sell the airline even in their spare time."

Particular credit is given by the official to Dick King, TPA's vice president-traffic who is largely responsible for TPA now getting 25% of the total tourist business coming into the islands.

To make its DC-3's more attractive in the face of HAL's Convairs, TPA pushes the "scenic" advantages of lower-altitude flying in DC-3's.

Other innovations since it ente.ed the market include (1) family plan fares, (2) making hotel reservations for passengers, (3) group ticketing techniques, (4) delivery of tickets, and (5) establishment of public address systems on its planes.

TPA's counsel, Harry A. Bowen, is currently working on a proposal with the Post Office to extend the surface-mail-by-air experiment to Hawaii where TPA would carry the mail for 30¢ per ton-mile.

The company had asked CAB for permanent rights in the present renewal fight. Although that remains to be decided by the board, the optimistic results forecast by examiner Ruhlen for the remainder of this decade indicates TPA is pretty firmly established.

• • •

ALPA-American Agreement Includes Pilot Flight Credits

Final agreement between American Airlines and the Air Line Pilots Association on the eight-hour flight rule, based on recommendations of neutral David L. Cole (AMERICAN AVIATION, Jan. 31), provides that:

• **On all flights** scheduled for more than eight hours (westbound non-stop transcontinental DC-7's), the pilots and co-pilots will receive time-and-a-half in pay and time-and-a-half in flight time credit toward the 85-hour monthly maximum for all time over eight hours.

• **An "over-ride"** of $1.50 an hour for pilots and $1 an hour for co-pilots of these scheduled nonstop DC-7 flights will be paid for all hours flown, even if the flight should not be completed or finished in less than eight hours.

• **American Airlines** will withdraw its $1.25 million breach of contract suit against ALPA, and ALPA will void its outstanding strike authorization against AA.

The supplemental agreement will remain in effect at least as long as the new contract AA and ALPA are about to negotiate. The old agreement expired Feb. 1. The eight-hour rule in the basic contract will be continued without change, with exception for the nonstop DC-7 flights scheduled to end as soon as these planes can make the flight in the shorter time.

Mohawk Line Has Best Year In Its History

The best year in the history of Mohawk Airlines was 1954, as the break-even need and federal subsidy were reduced and 1953's loss was followed by 1954's profit, according to president Robert E. Peach.

MOH netted a profit of $162,468, in contrast to the previous year's loss of $34,550. For August, September, and October the local service carrier showed a net operating profit without mail pay subsidy.

CAB BRIEFS

CAB Applications

Capital Airlines wants CAB to suspend fares filed by **Northwest Airlines** and **New York Airways** for a joint trunk-helicopter operation in New York area.

Eastern Air Lines and **Colonial Airlines** filed new merger agreement for CAB approval.

Allegheny Airlines applied to serve Franklin/Oil City and Philipsburg/State College/Clearfield, Pa., on route to New York, Philadelphia, and Cleveland.

Delta-C&S Air Lines applied for certificate changes to add Nashville and Louisville, extend Route 8 from Evansville to Louisville and Cincinnati, and extend Route 54 from Cincinnati to Columbus, Cleveland, and Detroit.

National Airlines applied for extension beyond Baltimore to Pittsburgh and thence to Buffalo, Cleveland, and Detroit, or, new route Washington to Buffalo and Detroit via Baltimore, Pittsburgh, and Cleveland.

Recent CAB Decisions

Compania Dominicana de Aviacion (CDA) authorized to serve Cap-Haitien and Port-au-Prince as intermediates between Miami and Ciudad Trupillo.

Empresa Guatemalteca de Aviacion granted 3-year permit for passenger-mail-cargo service Guatemala-Belize-Miami and mail-cargo service Guatemala-New Orleans.

National Airlines exemption for passenger helicopter operations in Miami area extended to March 1, 1955.

CAB Calendar

Feb. 14—Prehearing conference, Basra Service Investigation. Washington, D. C. Docket 6992.

Feb. 15—Oral argument, London/Frankfort-Rome Service Case. Washington, D. C. Docket 5737 et al.

Feb. 23—Hearing, Transportes Aereos Nacional Foreign Permit Case. Washington, D. C. Docket 6737.

Feb. 24—Prehearing conference, Frontier Renewal Case. Wash. D. C. Docket 6584.

Feb. 28—Hearing, Reopened Transatlantic Final Mail Rate Case. Washington, D. C. Docket 1706 et al.

Mar. 7—Hearing, Domestic Trunklines Service Mail Rate Case. Washington, D. C. Docket 6599 et al.

Mar. 8—Hearing, Midet Aviation Corp. Certificate Renewal Case. Tentative. Docket 6743.

Pending Cases

Examiner William Cusick's report in the **North American Airlines Enforcement Case** is completed but can't be issued because of a legal proceeding aimed at suppressing the report until Cusick issues his recommendation in the New York-Chicago Route Case.

CAB's controversial **States-Alaska Case**, dormant since a Dec. 8 vote to drop the two Alaskan lines, will be reactivated when the new CAB member takes his post.

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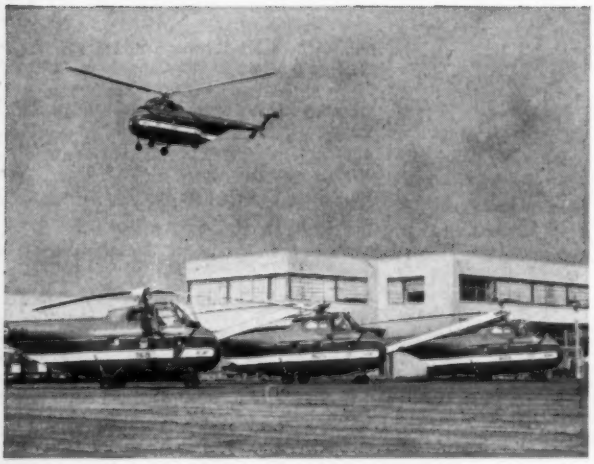
NEW SERVICE STARTS—Hostesses of five airlines—United, Western, Pan American, American and TWA—cut a ribbon to open Los Angeles Airways' first helicopter passenger route after eight years of scheduled mail operations. First passenger service is between Long Beach and Los Angeles International Airport, with Sikorsky S-55s.

AROUND THE WORLD WITH SIKORSKY HELICOPTERS

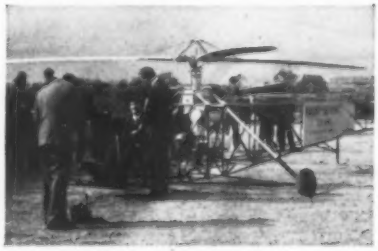


RCAF SIKORSKYS—First all-helicopter squadron in the Royal Canadian Air Force is now in operation with rugged Sikorsky S-55s. These wilderness-proved transport helicopters are now based at Bagotville, Quebec. Here are four of ten S-55s in the initial Canadian order. All were flown to Canada from Sikorsky's plant.

BRITISH USE S-55s—Helicopter passenger service between London Airport and Waterloo is scheduled to begin this spring. British European Airways will use S-55s for the flights, which take 18 minutes each way compared to more than an hour by surface travel. BEA pioneered helicopter passenger flights in 1950 with S-51s.

SERVICE EXPANDS—New York Airways has expanded scheduled helicopter passenger service both north and south from its New York City inter-airport routes. Cities added were Trenton and New Brunswick, New Jersey, on the south, and suburban White Plains, New York, and Stamford, Conn., on the north. Above, passengers board a Sikorsky S-55 at the heliport in Stamford.

America's First Truly Successful Helicopter —Sikorsky VS-300



MAY 20, 1940—First public view of Sikorsky's historic VS-300—America's first truly successful helicopter—came May 20, 1940 as Igor Sikorsky was awarded Helicopter Pilot License No. 1. The VS-300 was only the first of many Sikorsky achievements in advancing helicopter development and industry-leading production efficiency.

SIKORSKY AIRCRAFT

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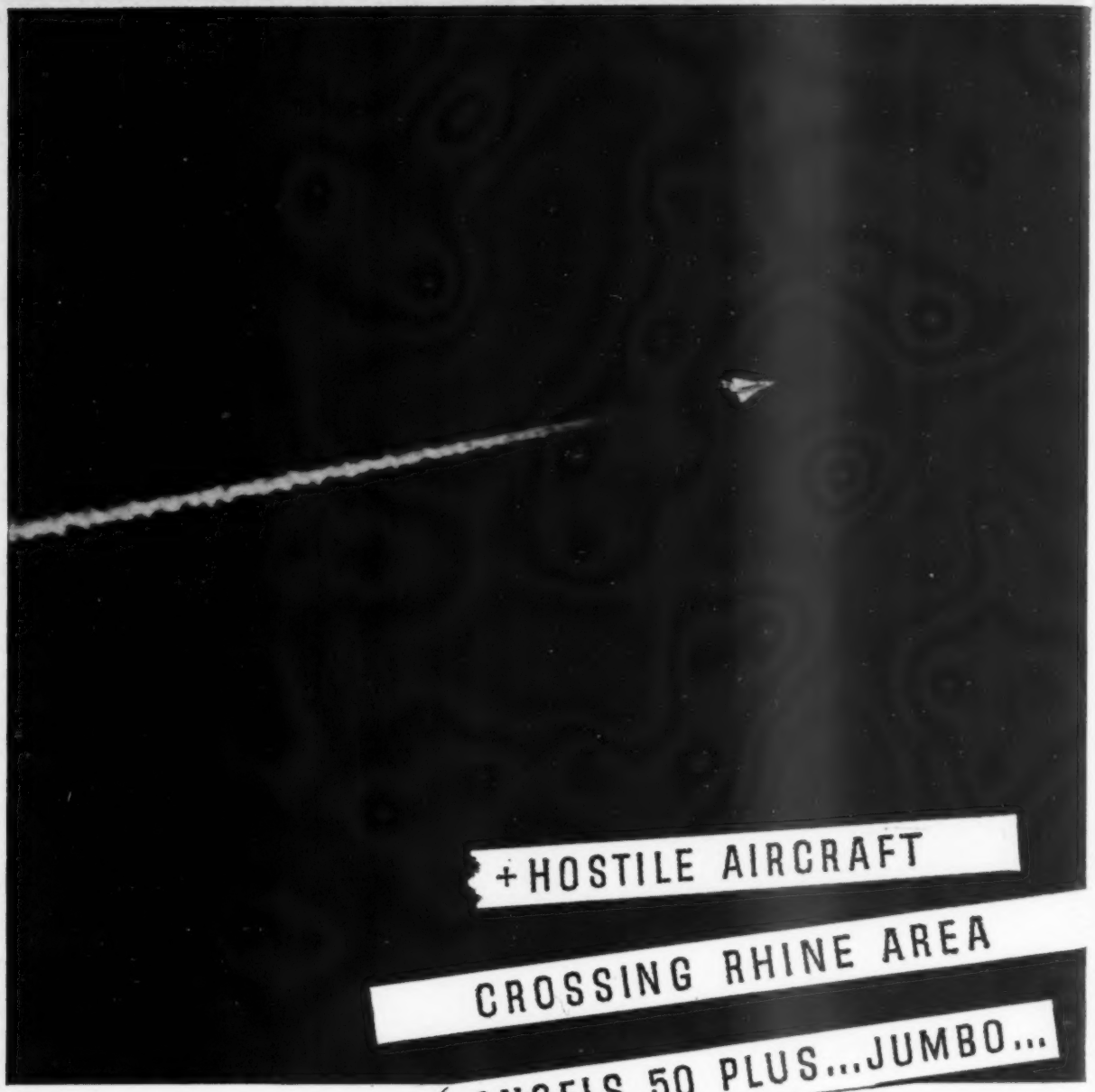

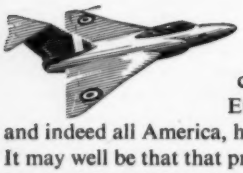

If–and when–that message is clicked out on the teletypes of Western Europe's radar network, New Yorkers, and indeed all America, had better batten down their hatches. It may well be that that pregnant message will signalise the outbreak of World War III. For those who are not airmen, Angels 50 Plus is R.A.F. lingo for altitude over 50,000 ft. Jumbo could mean carrying the Big Bomb, Atomic or Hydrogen. It is a laconic message, but then the R.A.F. is given to understatement.

At that precise moment Javelins will be in the air, fair weather or foul, able to fly and fight higher, faster and more destructively than any other fighting aircraft has ever done in history. The Javelin is not a Sunday flier. No other aircraft in the world equals it in fire power and in that all-important radar. It carries two men–one to fly the machine and the other to work the infinitely complicated radar gear. No one man can do both jobs.

All that can be said within the bounds of Security is that when the time comes, there will be Javelins in the air ready for operational duty within minutes of that ominous tickertape alarm. Take a look at your map. It is not very far from the Rhine to London, hence the importance of the all-weather Javelin.

DAY AND NIGHT ALL WEATHER FIGHTER

Gloster Javelin

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By Anthony Vandyk

MEXICO CITY—The widely differing international fare levels in the area between the U. S. and northern Latin America caused a special meeting of the International Air Transport Association to be held here late last month.

Prime purpose of the meeting was to discuss Guest Aerovias Mexico's tourist fare of $90 one-way and $171 round-trip for its recently opened Mexico City-Panama City route. This compares to the IATA tourist fare of $121 and $217.80, respectively.

* *

Guest, a member of IATA, is the only carrier to provide non-stop service between the two cities. The Mexican airline operates DC-4 equipment on the route.

* *

Guest says that its fares were based on the request of the Mexican government for a maximum one-way fare of 6¢ per mile, which, with a 5% discount for round-trip, results in a fare of 5.7¢ per mile for round-trip travel. For purposes of comparison, Guest has compiled a tabulation of international fares applying north and south of Mexico City, fares for international services in the same area that by-pass Mexico City, and representative domestic fares.

* *

The relative average fares per mile reflected by these tabulations are as follows:

	First Class	
	One Way	Round Trip
North from Mexico City	6.4¢	5.9¢
South from Mexico City	9.3	8.4
By-passing Mexico City	8.4	7.6
Domestic from Mexico City	4.8	4.3

	Tourist Class	
	One Way	Round Trip
North from Mexico City	4.8¢	4.6¢
South from Mexico City	8.0	7.2
By-passing Mexico City	6.9	6.3
Domestic from Mexico City		(none)

* *

From these figures it seems that the present fares applying south from Mexico exceed by approximately 45% on first-class services and 62% on tourist services the prevailing fares that apply north from Mexico City.

Olympus 101

Most Powerful Turbojet?

THE BRISTOL Aeroplane Company claims that its 11,000-lb.-thrust Bristol Olympus 101 (Ministry of Supply designation B.01.1/2C) is the world's most powerful type-tested turbojet. The engine has been approved for service at the 11,000-lb. rating dry and without afterburning. The Olympus 101's 150-hour type-test included five hours at take-off thrust and a short period at overspeed.

Only maintenance permitted was a periodic check of fuel and oil filters Two-spool layout, Bristol says, gives (1) low fuel consumption over wide altitude range, (2) better maintenance of power at great heights, (3) easy starting and handling, and (4) very quick acceleration from idling to full power.

Transport Briefs

Canadian Pacific Airlines has been given Canadian government permission to operate from Vancouver to Amsterdam via Churchill, Manitoba. A weekly DC-6B service will be inaugurated early in May. . . . **Guest Aerovias Mexico** aims to start operations to Windsor, Ontario, (serving Detroit) before the end of the year. Carrier plans to buy three L-749 Constellations and, later, an advanced version of the Super Constellation for its projected non-stop route from Mexico City to New York.

Surinam Airways is a new company formed in Paramaribo to operate services to the interior of Dutch Guiana. It has taken delivery of two Bell 47G's, two Cessna 170's, and one Stinson Reliant, and will start scheduled operations shortly. . . . **Chile's LAN** has taken delivery of the first of three DC-6B's for use, initially, on routes from Santiago to Buenos Aires and Montevideo, Lima, and Magallanes.

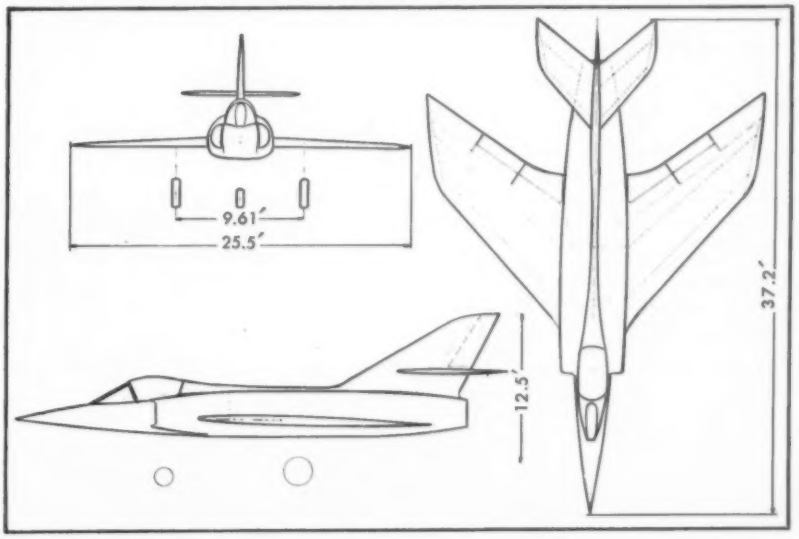
Air Charter Ltd., British independent, has been given U. K. government approval to have dollars to buy three DC-4's for about $300,000 each. . . . The Communist Chinese government has paid $1,027,600 as compensation for the **Cathay Pacific Airways'** DC-4 which was shot down by Red fighters last July. . . . The merger of **Orient Airways** with Pakistan International Airlines will be completed soon; the Pakistan government will hold 75% of the proposed PIA Corporation's capital. . . . **Transporturi Aerienne Romine** is the name of the state-owned Rumanian airline which has supplanted **TARS**, the carrier jointly owned by the Soviet and Rumanian governments.

Manufacturing Briefs

Spain's **AISA** aircraft plant at Crabanchel was badly damaged by a recent fire; 40 I-11B light planes destined for Spanish aero clubs were destroyed. . . . **Fokker's** break-even point on the F-27 Friendship transport will be 50 to 60 aircraft (at $460,000 each). . . . The **Bristol** Orpheus turbojet, lightweight fighter powerplant, has started its bench trials. . . . France's **Hispano-Suiza** has built some 200 Rolls-Royce Tays under license to date. . . . **Fairey Aviation Co. of Canada**, already established in the East (at Darmouth, Nova Scotia), is establishing facilities in the West at Pat Bay, Vancouver Island.

Stabilimenti Avio Fiat is the name of a new wholly owned Fiat subsidiary which has taken over all of the Italian company's aviation activities. . . . Italy's **Aerfer** recently completed its first full overhaul of an F-84G for the Italian Air Force. . . . The **Napier** Eland has passed its 150-hour test at 3000-hp rating.

DASSAULT'S LIGHTWEIGHT TACTICAL FIGHTER design is the Mystere XXVI. Powered by a Bristol Orpheus, the aircraft will be capable of operating from a grass strip.



Olin Mathieson's DC-3... A sub-zero Canadian night... In one engine— New Koolmotor Aero Oil... In the other—another brand...

...and here's what happened!

The pilot was Neil Fulton, the firm: Olin Mathieson Chemical Corporation, Baltimore, Maryland. Assignment: take a DC-3 through Canada in sub-zero January weather.

Before leaving, Fulton conceived an interesting and profitable experiment. In one engine he placed the aviation oil that was standard for Olin Mathieson's operation at that time. In the other, he put Cities Service New Koolmotor Aero Oil.

Then came the night he had to leave his DC-3 out on the bitter-cold ramp of Toronto Airport. Next morning, with the thermometer reading eight below zero, Fulton climbed into the plane to start the engines. Trouble? . . . trouble you bet . . . trouble starting. But the first engine to kick over was the engine using Cities Service New Koolmotor Aero Oil!

That was enough to sell Neil Fulton on New Koolmotor Aero Oil . . . and he's used nothing else ever since! Summing up his experience, he says: "Cities Service New Koolmotor Aero Oil provides far more satisfactory results in *any* weather and has enabled a substantial reduction in oil consumption and general maintenance expenses."

Results such as Neil Fulton's are not the exception, but the rule, with New Koolmotor Aero Oil. This improved aviation oil can produce similar results for you. Why not try it? You'll find it wherever the familiar emblem of Cities Service Aviation Products is displayed.

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Circle No. 31 on Reader Service Card.

EN ROUTE . . .

WAYNE W. PARRISH

More on the subject of food and lodging

HERE'S some more hotel and food items:

How many hotel bathrooms have you ever been in that had a place to hang up a wash cloth? Every inch of the towel rack is always taken up, so I resort to putting the wash cloth on the side of the bathtub or hang it on a faucet. Then the maid proceeds to hide it somewhere when she cleans up the room. Don't hotel managers wash their faces with cloths?

Then there's telephone service. I must say that I'm a little more tolerant on this subject because the human element is more difficult to handle than room fixtures. But some hotels continue to maintain antiquated message systems. Telephone service is one of those unpredictables. I've had excellent service sometimes, only to find that friends in the same hotel were complaining. The only conclusion I can reach is that every hotel should put its utmost efforts toward maintaining the best service possible.

Those paper-thin walls

The most discouraging trend in hotels, at least for a country that is noted for having the finest technical construction facilities the world has ever known, is toward the paper-thin walls I've encountered several times recently. Architects seem bent on lavishing big expenditures on plush fronts and lobbies, but penny-pinch on room construction. I'm one of those birds who thinks privacy is all-important in a hotel room. I don't care and don't want to know what's going on next door. Also, I don't care to have my telephone and other private conversations listened to by my neighbors.

Not long ago I stayed at the Adolphus Hotel in Dallas, always jammed with conventions and one of the busiest hotels in the country. I was delighted to be taken to a room in the new addition, thinking I was getting a break. I was also delighted to find a fine sound system in the room for music and news. But I was soon to get the sad news. The walls of the new addition are so thin that I didn't have to turn on my radio, I could not only hear music from next door but from the room beyond that. When the guy next door coughed or talked on the phone I could swear he was in my own room.

Pity Aunt Millicent

Such lack of privacy is shocking, especially in a hotel that caters to conventions. Quite apart from the fact that Aunt Millicent is in for all of the crudities and low-life of the average American convention-attender, if she is unlucky enough to be in the new addition, the fact remains that privacy and quiet should be an absolute "must" for a good hotel room. Somebody missed badly on this one.

Then take the new Statler in Los Angeles—an attractive, modern structure about which many nice things can be said. The room bathrooms are excellent. But penny-pinching went into wall construction with the result that privacy is ruled out. Anyone who travels a lot is often on an irregular schedule. You sleep when you can get it. Arrivals are sometimes late at night. But in addition to the necessities of quiet, it is disturbing that telephone conversations and the like are virtually public knowledge.

I've been a strong advocate of hotels or motels on or adjacent to the larger airports. Pittsburgh has a hotel inside its terminal and I understand it's a pretty good success. Motels are being planned for Wold-Chamberlain in Minneapolis and Fort Worth International. A new motel has been opened near LaGuardia in New York. Recently I stayed overnight at the new Hyatt House adjacent to Los Angeles International.

The Hyatt House is a super-modern two-story hotel built around a swimming pool, with ample parking space in the rear. My only objection is that the rates are a little high, especially for the type of overnight business which air travelers require. I suppose a swimming pool is a big asset but it was quite cold when I was there and I expected to see icebergs floating around. My idea of an airport hotel is plain, simple rooms, each with bath or shower, space for luggage, and minus the frills you'd expect at a resort or in a big hotel where you're going to be for several days or a week. But Hyatt House is strictly first class.

Turning to food, one of the best restaurant areas in the world is La-Cienega Boulevard in Los Angeles. Lots of fine eating places. Some weeks ago I wanted to take some people out to dinner and it was important that I make a good impression. You know very well what happened. I picked the Tail O' the Cock, which heretofore had been pretty good, and I sure had some apologizing to do. The martini was so raw I couldn't even finish mine, and believe me, that's saying something. I ordered a New York cut prime sirloin steak and what was put before me was an indifferent small steak with gravy on it. The service was very poor and the evening was a disappointment.

Love that Farmer's Market

But I did find AA-1 martinis and good food at Richlor's on LaCienega a few days later.

Of course, when it comes to food the place you must never miss in Los Angeles is the Farmer's Market at Third and Fairfax. Open all day until 6 or 7 in the evening. The market has nothing to do with farmers but it's a wonderful collection of stalls selling everything from cooked foods to fruits and vegetables and all sorts of special items. For a picnic lunch you go from one stall to another, picking up specialties, and I guarantee it will cure anemia and add calories. It's hard to describe the place to anyone who's never been there because there isn't anything like it anywhere else in the world. Just watch out for that banana marshmallow ice cream if you're as plump as I am.

A pet gripe is the small, poorly organized news stand found in most airport terminals. Our nomination for the best news stand in any U. S. airport goes to Wold-Chamberlain Field, Minneapolis, pictured here.

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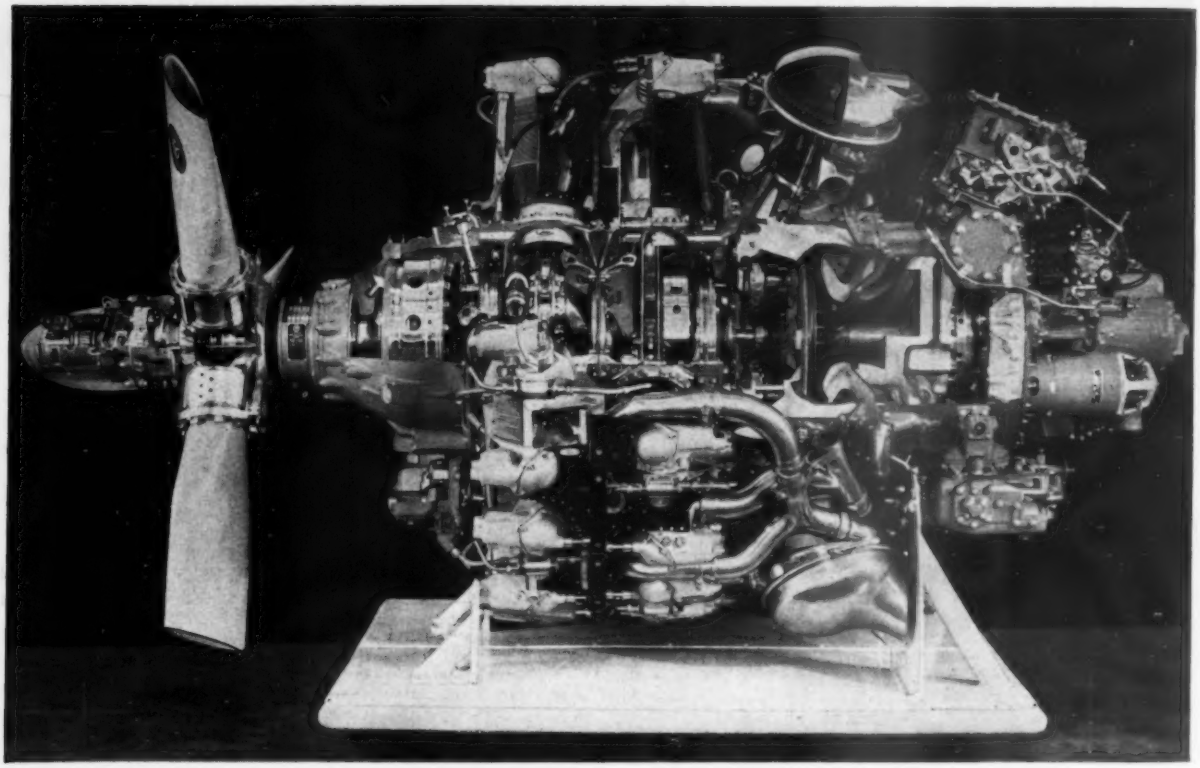

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